ASSESSMENT REPORT

ON

REDSTONE PROPERTY, ELDORADO TOWNSHIP

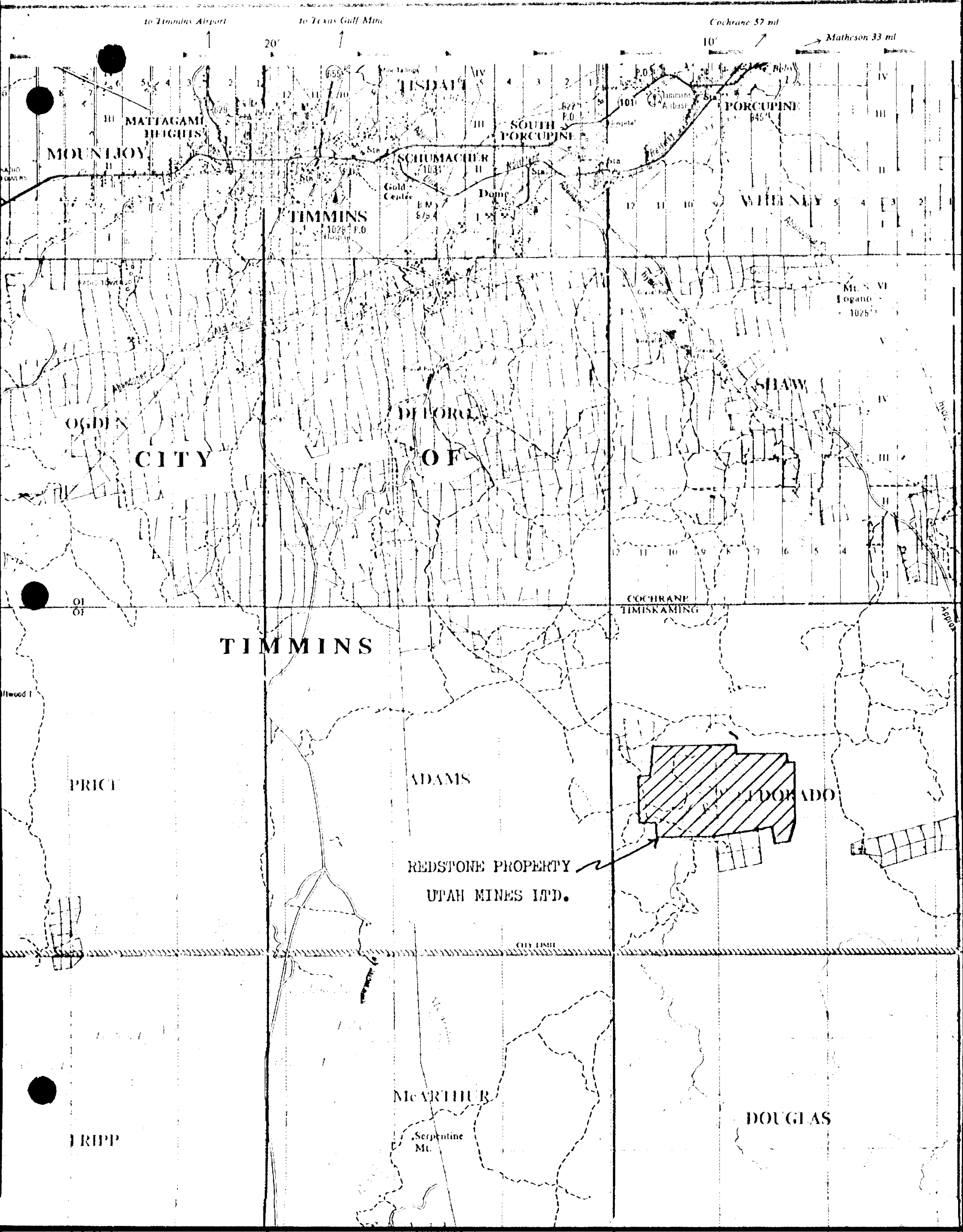
OF

UTAH MINES LIMITED

DECEMBER, 1976

BY: Louis Godbout

Project Geologist



to Timmins Airport
to Texas Gulf Mine
Cochrane 57 mi
Matheson 33 mi
MATTAGAMI HEIGHTS
MOUNTJOY
TISDALE
SOUTH PORCUPINE
PORCUPINE
SCHUMACHER
TIMMINS
WHITNEY
OGDEN
CITY
DELORO
OF
SHAW
COCHRANE
TIMISKAMING
TIMMINS
PRICE
ADAMS
ELDORADO
REDSTONE PROPERTY
UTAH MINES LTD.
CITY LIMIT
McARTHUR
Serpentine Mt.
DOUGLAS
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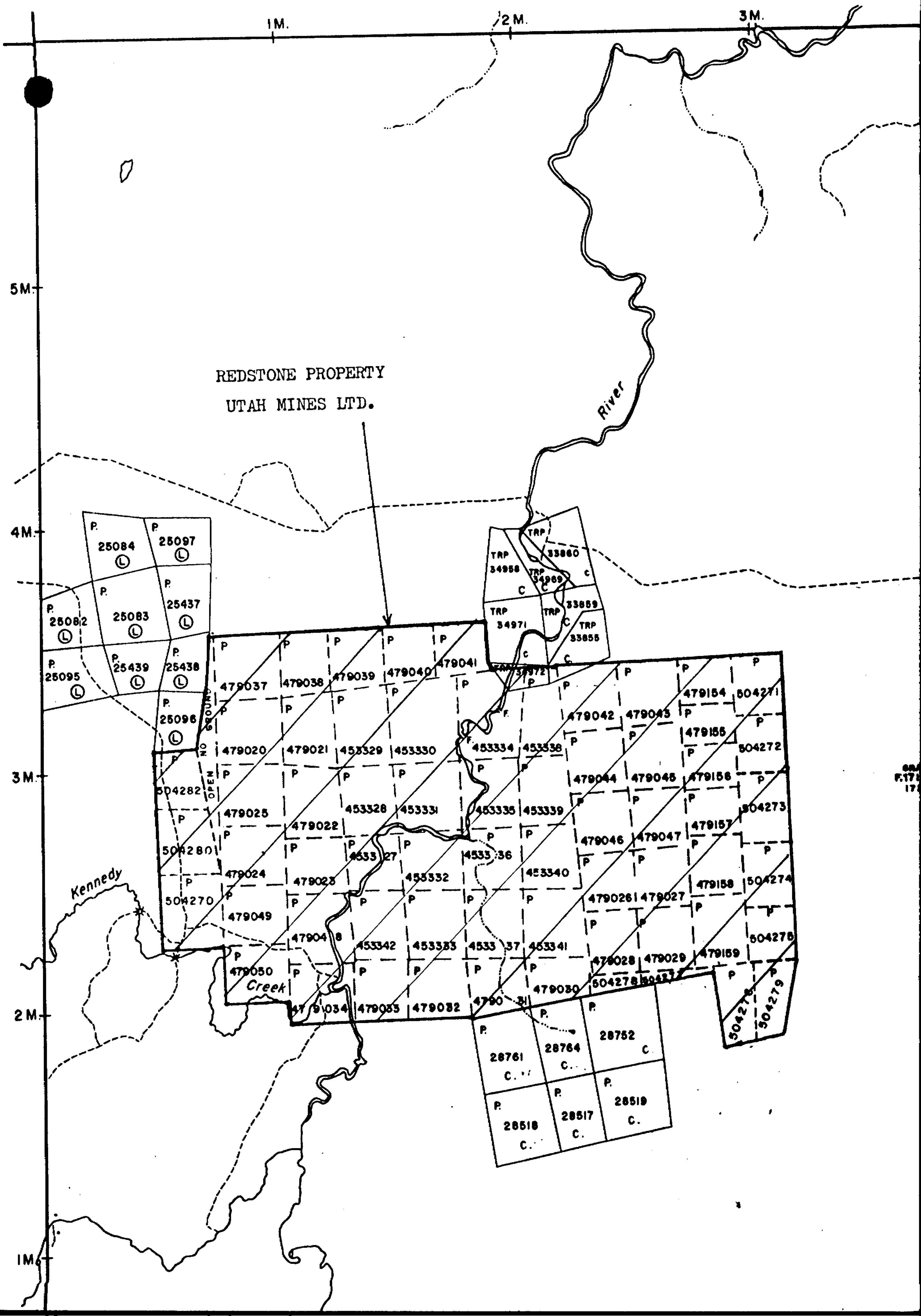
Adams Tp. - M.2_1



REDSTONE PROPERTY
UTAH MINES LTD.
River
Kennedy
Creek
1M.
2M.
3M.
5M.
4M.
3M.
2M.
1M.
25084
25097
25082
25083
25437
25095
25439
25438
25096
NO GROUND
OPEN
504282
504280
504270
479037
479038
479039
479040
479041
479020
479021
453329
453330
479025
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479049
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504272
479156
504273
479157
479158
504274
479159
504275
504279
TRP
34958
33860
34969
33859
34971
33855
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28752
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28517
28519

INTRODUCTION

This report is a description and summary of surveys completed on the Redstone Property in 1977 - 78. The report and attached data plans, of scale 1" = 400', are being submitted as assessment work, to be credited to the Redstone Property of Utah Mines Limited.

(a) PROPERTY LOCATION AND DESCRIPTION

The property is a block of sixty-three claims located in the middle west half of Eldorado Township. The center of the claim block is exactly thirteen miles southeast of Timmins at latitude 48 21' and longitude 81 10'. The block is 2.7 miles long in a east west direction and 1.6 miles wide covering an area of approximately 2520 acres.

The claim numbers and dates of staking are as follows:

CLAIMS	TOTAL	DATE STAKED
453327 - 453342	16	July 10 1976
479020 - 479034	15	June 13 1977
479037 - 479050	14	June 13 1977
479154 - 479159	6	June 16 1977
504270, 504280, 504282	3	August 22 1977
504271 - 504279	9	September 2 1977
	TOTAL = 63	

(b) ACCESS

Two wheel drive vehicles can be negotiated to the property by driving south from South Porcupine on the Langumuir Mine Road. Two miles southeast of the Redstone River bridge is the intersection of the Langmuir and Springer roads. The Springer road is a private lumber road maintained by Ken Stringer of South Porcupine. It proceeds south for six miles to the intersection of the newly constructed Redstone road. The Redstone road extends 2.6 miles west from the Springer road and stops 300 feet east of the Redstone River. The Redstone road was consturcted during the summer of 1978. It is a private gravel surfaced road and is not kept open during the winter. The Buffalo Ankerite four wheel drive road is negotiable from Timmins to the southwest corner of the property. It is a rough two to three hour drive covering a distance of twelve miles.

(c) TOPOGRAPHY AND VEGETATION

The land surface is mostly flat and low lying with thick alder and cedar swamps occupying fifty percent of it. Swamp covers the southeast corner, nearly all the area west of the Redstone River and the central northeast part of the property. The most significant topographic features are two prominent ridges 500' - 1000' wide, trending roughly towards azimuth 070° . One traverses the north center of the property and a second more extensive ridge traverses nearly all the south half, from the Redstone River to the northeast corner. The ridges are a product of slower erosion of large diabase dykes which occupy their core. Less erosional resistant volcanic and sedimentary rocks flank the diabase dykes on both sides of the ridges. Topographic relief associated with the ridges is as much as 100' above the surrounding land surface. There are half a dozen outcrop pinnacles scattered over the property which rise 20'-50' above surrounding swamp land.

The Redstone River flows north-north-easterly through the center of the property where there are three sets of rapids. There are no bridge crossings in the property area where the river averages forty feet wide.

There are at least six active beaver ponds on various tributaries of the Redstone which flow north westerly towards it.

Tree vegetation along the river shoreline is jack pine, black spruce and poplar, which also occupies the higher relief areas such as the ridges. The swamp areas are claimed by thick alder growth and are mixed with stunted cedar in the lowest lying areas.

(d) HISTORY

1. Geological mapping

The earliest work recorded in the area was by Burwash in 1896. He mapped outcrops along the boundary of Eldorado and Adams Township and along the Redstone River in Eldorado Township.

Harding and Berry, of the Ontario Division of Mines, mapped the townships of Adams, Eldorado,on a scale of 1" = 1 mile, in 1937. The most recently public funded mapping was done in the summer of 1969 by D. R. Pyke of the Ontario Division of Mines, who produced a 1" = $\frac{1}{2}$ mile geology plan of Adams and Eldorado Townships.

2. Mining Exploration

Prospecting was probably the first type of exploration done as evidenced by at least twenty pits and trenches scattered over the property. The pits are usually six feet by six feet and eight to ten feet deep. In most cases this work was done for gold evaluation of sulfide iron formations which turned out to have no economic significance. One pit located on the east side of the property in claim 504271, contained massive pyrrhotite with disseminated chalcopyrite which assayed 0.25% Cu. The pit was sunk 600 feet north of a log cabin which has nearly disappeared through decay.

Prior to the late 1950's, Mercury Investors held a small north portion of the property as part of a more northern claim block covering a gold bearing quartz vein near the river.

Falconbridge Nickel Mines Ltd. held twenty-six claims in 1961, which included most of the property east of the river and several claims on the immediate west side of the river near the camp. They apparently completed ground magnetic and electromagnetic surveys and mapped their property on a grid of picket lines spaced 400 feet apart and trending towards 030°. They drilled 15 diamond drill holes which encountered iron formation in nearly all cases.

Acme Gas and Oil Company held small portions at the northeast and south west corners of the property in 1966. This acquisition resulted from an aeromagnetic survey done on Eldorado and portions of surrounding townships.

Mining Corporation of Canada Ltd. in 1966, held a block of 32 claims which included the southeast $\frac{1}{4}$ of the property. They completed 1745 feet of diamond drilling, most of which was in three holes on the property. Their targets were conductors which proved to be graphite and iron formation.

2. Mining Exploration

R. J. Draper held sixteen unpatented claims in 1969, covering the same area as the present claim series 453327 - 453342. Canadian Nickel held the ground immediately east of and northwest of R. J. Draper the same year. Their holdings covered about 30% of the property which was part of a 104 claim block. They did ground surveys along north - south grid lines spaced 400 feet apart. They drilled at least five holes on the property in 1972-1973. This drilling was apparently done to test conductors not previously tested.

Utah Mines Ltd. staked sixteen claims in 1976, covering the area held by R. J. Draper, which had come open. The Falconbridge grid of 1961 was rehabilitated and magnetic and MaxMin E. M. surveys were conducted over the sixteen claims. Three untested conductors were delineated in this survey and were drill tested in the spring of 1977. The first conductor tested was in claim No. 453335 on the west side of the river and it proved to be a combination of barren iron formation and some nickel sulfide mineralization. Additional drilling was done that summer in an attempt to define the mineralization and an additional 47 claims were staked in the period of June 13 - September 2.

Seventy-five miles of new grid lines were cut that fall. Lines were cut and chained between the Falconbridge lines and new lines were established every 200 feet elsewhere on the property except south of the base line where they were spaced at 400 foot intervals.

The entire grid was rechained using the secant procedure. This type of chaining involved measuring elevation gradients between stations in order to reset the pickets at exactly 100 foot horizontal intervals. It also provided an accurate topographic plan which was essential to complete a more detailed MaxMin E. M. survey. This survey was done during November and December 1977 under the consultation of J. Betz of Toronto.

2. Mining Exploration

Vertical component magnetometer surveys were also done over the entire grid that fall.

Thirteen untested conductors were revealed in the survey and were drill tested during the spring of 1978. Twelve proved to be barren iron formation and a thirteenth was conductive overburden. The grid was extended over the following claims in the late summer of 1978. Claim No.'s 479041, 504270, 504280, 504282, 504276, 504277, 504278, 504277.

The grid extension was cut to complete the ground surveys over portions of the property not covered the previous year. The McPhar V. H. E. M. was used to complete the electromagnetic survey instead of the Apex MaxMin.

GEOLOGICAL MAPPING SURVEY

(a) PROCEDURE

The mapping project involved the participation of three, two man parties during the period of September 15 - October 28, 1977. Each party consisted of a graduate geologist and a junior field assistant. The assistant sited with compass and chained in outcrop positions and geological features which the geologist recorded on a field sheet of scale 1" = 200'. The geological data and other surface features, such as roads, swamps, streams, claim posts and beaver ponds were transferred on to a geological base plan at the days end. Daily plotting was encouraged to facilitate and co-ordinate interpretative mapping between the three parties.

The final geological interpretation incorporated the surface mapping data, all drill holes completed by Utah Mines Ltd. and twenty-three by previous owners and magnetic and electromagnetic data.

A considerable number of outcrops were sampled and assayed especially the ultramafic rocks which were assayed for nickel and MgO. This assay data is included on the geology plan.

(b) RESULTS AND INTERPRETATION

General Description

Good outcrop exposure covers about 20% of the property and is concentrated along the two diabase ridges and several offshoot dyke ridges. The remaining outcrops occur at the outcrop pinnacles usually located in swamps.

(b) RESULTS AND INTERPRETATIONS

General Description

The bedrock is early Precambrian in age with the exception of the dykes which are Middle to Late Precambrian. On a regional scale the property occurs on the southwest corner of the Shaw Dome, a major linear dome structure, which extends 19 miles southeasterly from Timmins to Carman Bay on Night Hawk Lake. The dome is eight miles wide. Stratified rocks dip away from the dome center in most cases.

Stratified rocks on the property dip to the southwest at 50° - 90° and have an average strike of 120° . They consist of volcanics and lesser volcanically associated sediments. Interlayered, intermediate to rhyolite tuffs and mafic to ultramafic tuffs and flows constitute the volcanics. Stratified rocks are present in all areas except the southwest corner and the extreme south central boundary area. These areas have been intruded by granodiorite to quartz monzonite rocks which are the northeastern part of the Adams - Price Township pluton. Also included in the stratified rocks are cherty sulfide and lesser oxide iron formations. Minor argillaceous sediments and graphite are also found associated. Included with the stratified rocks are dacitic lappilli flows or feldspar porphry sills.

Lithologies

The ultramafics belong to the Komatiitic suite. They appear to be flows as evidenced by the following features; basal cummulate textures, polysutured surfaces, spinifex and bird track textures. The basal accumulate zones of the ultramafics are moderately to highly serpentinized, contain abundant random magnesite veins and subcommercial quantities of asbestos fibre.

(b) RESULTS AND INTERPRETATION

Lithologies

Stichite, a purple magnesium carbonate alteration mineral, occurs in restricted zones of the basal ultramafics. Stratigraphically, above the ultramafics, are magnesium basalts or picrites which have been mapped as mafic volcanics. They appear to be the more tuffaceous phase of the ultramafics and also occur at the same stratigraphic horizon as lateral equivalents of the ultramafics. The ultramafics and mafic volcanics are usually highly magnetic containing up to 2% magnetite.

The mafic volcanics have been altered to chlorite, talc and minor tremolite. The ultramafic to mafic rocks occur as three and possibly four stratigraphic horizons 200 to 1000 feet thick and separated by intermediate volcanics. The two stratigraphically lowest horizons on the property have considerably thicker zones in the northeast quarter. In these areas they appear to be intrusive and could be interpreted as plugs or sills and sources of the volcanic ultramafics.

The inter - ultramafic rocks are mostly intermediate volcanics which constitute 60% of the stratified rocks. They are andesite, dacite and minor rhyolite tuffs, with moderate to poor bedding. They commonly have a schistosity parallel to bedding. Conformable with the volcanics are feldspar porphry sills or flows of dacite composition. Plagioclase phenocrysts $\frac{1}{4}$" to $\frac{1}{2}$" long occurring in a fine grained sericite rich matrix are quite characteristic of these units. The feldspar porphries are 1 to 30 feet thick. The volcanic rocks have under gone green schist metamorphism explaining the presence of chlorite and sericite. The andesite tuffs in some cases appear to grade compositionally into mafic volcanics which can be stratigraphically separate from the ultramafics.

(b) RESULTS AND INTERPRETATIONS

Lithologies

There are at least three cherty sulfide to oxide iron formation horizons within the interultramafic rocks. Minor carbonate occurs in some pits excavated in them. The formations have intermittent lateral continuity and appear to represent periods of volcanic quiessance when only sedimentary to chemical deposition was occurring. Their intermittent occurrence may have been a product of deposition only in the lowest points of a palaeo surface. One horizon was traced for a strike distance of 4000' in a drilling program by Falconbridge in 1961. The iron formations have the highest magnetic relief and can be easily traced since they occur within the interultramafic volcanics which have very little magnetic expression.

The felsic intrusives as previously mentioned are granodiorite to quartz monzonite in composition. They occupy 15% of the property and were intruded into the stratified rocks. At several localities they contain quartz veins along joint systems with disseminated fine grained pyrite. These occurrences have been trenched and sampled for gold in the past. The mafic minerals in the intrusives have been altered to chlorite.

The youngest rocks are the diabase dykes. The two major ones occur in the ridge cores as previous described. The northern dyke has been mapped as a feldspar gabbro containing over 50% plagioclase. Its texture is coarse grained and very homogeneous. It has a reasonably uniform width of 500 feet. The southern dyke is more mafic containing about 40% plagioclase. It is not as coarse grained and has distinct aphanitic chill zones 1 - 2 feet wide. It varies considerably in width from 200 to 400 feet. At several localities it branches out into smaller dykes. The largest branch dykes occur near line 50 east at station 12 north, where one dyke extends to the northwest from the main dyke and a second to the southeast.

Lithologies

These branch dykes may be occurring along a common older structural feature such as a fault.

The main diabase dykes appear to be vertical and have suffered no metamorphism. They are moderately magnetic and can be recognized on the magnetic plans.

Structure

Three prominent strike faults have been interpreted in the west half of the property. This interpretation is based on offsets occurring along the southern diabase dyke and the feldspar gabbro dyke. The extreme west fault strikes at 165° and has an apparent left lateral offset of 1900'. Volcanic rocks in the northwest corner have a strong schistosity parallel to the fault which is 30° - 40° from the regional schistosity. This fault was intersected in drill hole B - 1 as indicated on the geology plan.

A second interpreted strike fault is paralled and occurs 1000' to the east. It has a right lateral offset of 1400'. A third fault branches off from this one to the southeast. The faults in the west area pos date the dykes. Possible older faults in the east area may have provided routes for the diabase dyke system.

Conclusion

The ultramafic rocks are considered to be the equivalent to those which host massive sulfide nickel deposits around the Shaw Dome and the property should have potential for nickel mineralization.

MAGNETOMETER, ELECTROMAGNETIC AND TOPOGRAPHIC SURVEYS

These surveys were conducted over 85 miles of picket lines starting on November 5, 1977, under Utah Mines Ltd. staff supervision. They were completed August 30, 1978 as a grid extension project which included the last 10 miles of the surveys. The grid extension was surveyed with the McPar V. H. E. M. instead of the MaxMin II unit.

(a) MAGNETOMETER

Procedure

This survey was supervised by J. Vyselaar, geophysicist with Utah Mines Ltd. Mr. Vyselaar contoured the magnetic data on plan. The author,under the consultation of John Betz, consulting geophysicist from Toronto, correlated the magnetic data with the underlying bedrock to complete the geologic interpretation. The survey was a measurement of the vertical component of the earth's magnetic field. This method was preferred over total field methods because of anticipated high magnetic gradients.

A neutral base station was established near the camp. Subsidiary base stations were then established along the grid base line, which were tied to the camp station in a time diurnally corrected loop. Readings were taken every fifty feet along the picket lines. Survey loops were started and finished at the subsidiary base stations of picket line pairs.

Conclusions

The highest magnetic relief is coincident with pyrrhotite and magnetite bearing iron formations. These peaks are usually linear, narrow and trend parallel to bedding.

(a) MAGNETOMETER

Conclusions

The ultramafic belts produce the second highest magnetic relief and also trend parallel to the regional strike. The diabase dykes are quite distinguishable on the magnetic contour plan. They are slightly less magnetic than the ultramafic belts but, stand out because they cross cut the regional strike. The intermediate volcanics and sediments produce the lowest magnetic relief. The felsic intrusives display similar magnetic relief as the intermediate volcanics but in some areas there is small scale magnetic variation over them.

Additional magnetic interpretation is included in J. Betz's report on the MaxMin electromagnetic survey at the back of this report.

(b) TOPOGRAPHIC SURVEY (SECANT CHAINING)

Procedure

The secant chaining survey was recommended by Mr. Betz to provide refinement on picket line spacing and accurate data on slope gradients between stations. This was a requirement of a detailed MaxMin Electromagnetic Survey to be done after. The end product was an accurate topographic plan of the property and "noise free" electromagnetic survey data.

The Suunto inclinometer was used to measure the secant of slope gradients between stations. From the secant value a slope distance was computed which would have a corresponding horizontal component of exactly one hundred feet. The picket was then rechained to this location. Elevation differences between stations were also computed. Prior to this elevation base stations were established at all picket line crossings along the base line via the secant chaining method. This provided an elevation datum along the base line. The picket lines were then chained in loops like the magnetometer survey. By starting and stopping at elevation base stations in a two picket line loop, corrections could be made for each station elevation around the loop. Details on the procedure of secant chaining are included with the MaxMin II E. M. Operations Manual at the back of this report.

Conclusions

The secant topographic plan is reasonably accurate and probably superior to the results of a barometric survey. The barometric instruments fluctuate during weather or air pressure changes and the accuracy of these instruments is not refined enough to respond to the low to moderate relief on the property.

The topography on the property has been described in the previous "Introduction".

MAGNOTOMETER, ELECTROMAGNETIC AND TOPOGRAPHIC SURVEYS

(c) ELECTROMAGNETIC SURVEY

Procedure

Approximately seventy-five miles of picket line were surveyed with the MaxMin unit. Two units were operated simultaneously on different parts of the grid. One senior operator received and recorded the inphase and out of phase components of the secondary electromagnetic field. A second operator carried the transmitter and transmitted the primary field. Mr. Betz's interpretation and recommendations are included in his report which follows.

The grid extension area was done with the McPhar V. H. E. M. System in 1978. This unit was also run using the in-line method of survey. Both the 600 and 2400 CPS frequencies were used in the horizontal loop mode with a coil spacing of 200 '. Both inphase and out of phase components were recorded.

Conclusions

The grid extension involved 10 miles of surveying which delineated a couple of anomalies that had been drill tested by previous owners. The V. H. E. M. data was plotted on the profiles containing the magnetic and MaxMin data from 1977.

An operating manual on the McPhar V. H. E. M. is included with the MaxMin operating manual.

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REPORT ON THE ELECTROMAGNETIC AND MAGNETIC SURVEYS,
UTAH MINES LTD.
REDSTONE CLAIM GROUP
ELDORADO TWP, ONTARIO. NTS 42-A-6

INTRODUCTION

The main objective of this survey was to detect and outline copper-nickel-bearing sulphide zones, and volcanogenic copper-zinc-bearing sulphide zones, on the property. To this end, grid lines 200 ft apart were put in (compared to a previous line interval of 400 ft), to chart more effectively the rapidly changing character of the sulphide zones along their strike.

The ground EM system used on this project was the MaxMin II made by Apex Parametrics Ltd. of Markham, Ontario. The ground magnetic system was the MV-I fluxgate magnetometer made by Phoenix Geophysics Ltd. of Toronto. In fact, two of each system were used to speed up the coverage of the grid. The specifications and operating procedures for these systems are amply described in the operating manuals and other literature provided by these companies. They will not be repeated here.

The MaxMin II was used in the coplanar mode with the turns of the transmitting and receiving coils held parallel to the mean slope of the terrain (along the traverse line) between the coils, Knowing the mean slope of the terrain, and the coil spacing, at all reading points was insured by secantchaining the grids prior to the MaxMin II coverage.

The secant method of chaining and the use of the subsequent data are amply described in the MaxMin II manual. They will not be repeated here. However, it is worthy of mention here that the end result of secant chaining the lines is to have "noise-free" EM results. Two bonus features of secant chaining are:

a) equal station spacing on the horizontal plane, and

b) accurate topographic profiles along the line.

In fact, the topographic profiles shown on the profile sheets in this report are computed from the secant chaining notes.

A reconnaissance coil spacing of 400 ft (122 meters) and frequencies of 222 and 1777 Hz were used throughout the survey. The reasons for this choice of coil spacing and frequency are:

a) a coil spacing of 400 ft is a compromise value to get moderately good resolution of near-surface conductors and moderately good search-depth for deep conductors. It is always possible to use another coil spacing for follow-up work.

b) two widely-spaced frequencies lead to a fairly accurate conductivity-thickness estimate for conductive zones, as well as helping to interpret the shape and attitude of non-simplistic conductive zones. A very high frequency will detect very "poor" conductors which are scarcely visible to a very low frequency. A very low frequency will detect deep "good" conductors in the presence of shallow "poor" conductors - something that a very high frequency cannot do.

c) the results at one frequency serve to monitor the inevitable reading and/or recording error at the other frequency. Magnetic base stations were put in throughout the grid prior to the general coverage. These base stations were visited frequently throughout the course of the survey. In the absence of magnetic storms and micropulsations, the noise envelope of these models of magnetometer, used in the above-described technique, is 40 to 50 gammas; so, anomalous readings would have to be above this value in order to be detected with certainty.

The writer gave written instructions to Utah Mines Ltd. personnel on the method of secant chaining, and personal instructions on the job site on the operation of the MaxMin II equipment. J. Vyselaar of Utah Mines Ltd. was entirely responsible for the magnetic survey.

PRESENTATION OF RESULTS

The EM, magnetic, and topographic profiles for each line were plotted on special profile sheets. Copies of these sheets are bound in a separate book. They are bound in numerical order from L-82E at the east end of the grid to line L-56W at the west end.

The EM interpretation was done by the writer, and the magnetic contouring was done by J. Vyselaar of Utah Mines Ltd., on four separate plans at a scale of 1in= 200 ft.

Reduced-scale (1"=400') composites of the EM interpretation and of the magnetic contouring are included in the pocket at the end of this report.

DISCUSSION AND CONCLUSIONS

Although the electromagnetic results have been fully interpreted by the writer , the magnetic results have not been interpreted by the writer beyond their relationship to the conductive zones. A more comprehensive interpretation of the magnetic results, in terms of their relationship to lithological units etc. is left to the Utah Mines Ltd. personnel.

The interpreted conductive zones are lettered from A through R from west to east on the plan, with the exception of zones P and R which are in the central region. Zone P is centrally located, because it was given a letter designation late in the piece; zone R is centrally located, because it is the known ore zone, and the letter R had already been used to prefix previous drill hole numbers.

Depth, dip, and σ.T (conductivity thickness) estimates are shown in a few places along the different conductors. It should be borne in mind, however, that the depth and σ.T estimates can be somewhat in error due to the poddy nature of most of the conductors. Some attempt has been made to compensate for this in the interpretation, but the interpretation is inherently approximate.

The presence of poddiness is signalled by an appreciable discrepancy between the target depth interpreted from a standard Argand diagram, and the depth apparent from the steep profile gradients, e.g. an Argand diagram may indicate a depth of 100 to 150 ft , while the steep profiles gradients do not permit a depth beyond 25 ft. Of course, the "shallow" interpretation must be correct, or there could not possibly be steep gradients on the profiles. The reason for the large depth given by the standard Argand diagram is that the anomaly amplitudes are small due to the small size of the conductive source. The Argand diagram which is based on large-size conductive sources will inherently translate a small anomalous amplitude into a deep conductive source.

In the case of a single-line anomaly, one small conductive zone could be the cause of anomaly. However, where the anomaly extends over several lines ---- each time giving contradictory depth estimates (deep by the standard Argand diagram, and shallow by the profile gradients) -- then, it must be concluded that the overall zone consists of several loosely-interconnected "small", "good" conductive pods and/or patches. *

The concept of small loosely interconnected zones is easy to justify geologically, if one considers the sulphides being deposited on an irregular paleo-basement. The former basement troughs will contain thick sections of sulphides, while the former ridges will break the continuity of the sulphides --except for the odd sulphide-filled saddle which links up sulphide-filled troughs on opposite sides of the ridge.

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* In the writer's mind, there is a definite nuance between the words pod and patch. A pod is larger than a patch, e.g. 50-400' in strike-length vs. 25-50' in strike-length.

The method of indicating poddy and patchy conductors is by a broken line on the plan. However, the location of the breaks on the plan should not be taken literally as the location of the breaks in the field. It is not possible to pinpoint this sort of break with the comparatively coarse line and coil spacings used. For this, it would be necessary to use a small-scale instrument like the Double Dipole of Apex Parametrics Ltd. Such an instrument could chart the thick and thin sections of the conductive zones within 30 ft of surface, thus pointing to some trenching and very shallow drilling locations. However, no tool can map the change in thickness of the zones at even a moderate depth; so, there is no way of guiding a drill into a thick section of sulphides, once it exceeds a depth of about 50 ft. For this reason, it must be borne in mind, that a single hole drilled deep, or moderately deep, into one of the poddy conductive zones would not likely intersect a representative thickness of mineralization; several drill holes would be necessary for this.

Although a 400 ft coil spacing was used for the reconnaissance coverage of the grid, it was realized from the beginning that a smaller coil spacing would be desirable in a few places where a better resolution of closely-spaced conductors was desired. This turned out to be the case for zones D and R on L's 4E and 6E, where better resolution was achieved by using a 300 ft coil spacing at 50 ft centers. This can be seen on the profile sheets.

It is difficult to set up drilling priorities based on the σ.T value of the conductive zones. From previous experience in the Sudbury area and in Montcalm Twp. Ontario, it can be expected that the σ.T value of massive coarse-grained nickel-bearing sulphides will be large. Zone R is no exception to this, with a large σ.T value being determine on L-6E. However, some of the known iron formations on the property also have very large σ.T values, e.g. zones J, N and Q. Of course, there is also the possibility of economical amounts of nickel occurring in poorly conductive zones; so, zones cannot be ignored purely on the basis of a small σ.T value.

Likewise, the use of magnetics is of doubtful value in setting up drilling priorities, at least based on the direct magnetic response of the conductive zones. This becomes apparent, after observing the weak magnetic "lows" for zone R on L's 4E and 6E and the fairly strong magnetic "high" from the same zone on L-8E. The magnetic "low" on L's 4E and 6E is either due to some negative remanental magnetism in the zone, or to the fact that the zone lies within the "return" magnetic flux lines from the adjacent ultramafic rocks. Nonetheless, the nickel bearing zone is irregularly magnetic as is the known iron formation in many places along its length; so, it is difficult to set up drilling priorities on the basis of the magnetic characteristics of the conductive zones.

Ultimately, the mapped geology and the geology obtained from previous drilling in the area, expanded by the magnetic results, have played a large role in spotting the drill holes on the Max Min II conductors. The final decision on the drill hole locations came as the result of a joint effort between Utah Mines Ltd. geologist L. Godbout and the writer.

RECOMMENDATIONS

The recommended drill holes are shown on the reduced-scale plan of the conductor interpretation at the end of the report. They are also listed in tabular form on pages 9 and 10, with additional comments.

Holes R-19 ext, R-32, R-33, R-34, and R-35, which appear on the enclosed plan, do not appear in the following table, because they were picked to extend the at-depth knowledge of some recently completed drilling by Utah Mines Ltd.

CONDUCTOR DESIGNATION	HOLE NUMBER AND DESCRIPTION	ADDITIONAL COMMENTS
B	B-1 at 4+50S on L-32 W. Drill at -45° grid N for about 250 ft.	Zone B is far enough from zone A (iron formation) to possibly experience a change in mineralization. Its short strike-length is not encouraging.
$C\&C_1$	C-1 at 18+00N and 75 ft west of L-22W. Drill at -45° grid N for about 300 ft.	Utah hole #3 on L-20W was aimed at a very patchy part of conductor C, near its eastern end. There appears to be no explanation for the conductivity in the drill logs. The proposed hole is aimed at a less patchy section of conductor C, while catching conductor C_1 en route.
F	F-1 at 36+00 N and 75 ft west of L-10W. Drill at -45° grid N for about 200 ft.	This is a poddy conductor, as yet untested
$D\&R_1$	R-38 at 15+50N on L-4W. Drill at -45° grid N for at least 250 ft.	Both conductors are very patchy in this area. Not much extra drilling is required to include zone D on the way to zone R_1. This covers the possibility of a change in character in zone D.
D&R	R-37 at 15+50N on L-2E. Drill at -45° grid N for at least 150 ft.	Both conductors are patchy in this area. Not much etc., as above.
R	R-36 at 16+20N on L-6E. Drill at -45° grid N for at least 150 ft.	This conductor appears to mark the northern limit of the known Ni bearing zone. It appears to be fairly continuous in this area.
R	R-39 at 13+80N on L-10E. Drill at -45° grid N for about 300 ft.	This hole will test for an eastward plunge to conductor R, which appears to terminate to the west of the line.
G	G-1 at 3+25N on L-10E. Drill at -45° grid N for at least 550 ft.	This hole will test the central part of a previously untested conductor, which falls at, or close to, the northern flank of a previously unrecognized ultramafic unit. The hole will also sample a good part of the ultramafic unit before reaching the conductor. Conductor G bears similar characteristics to R, being highly conductive and having a weak magnetic "low".

CONDUCTOR DESIGNATION	HOLE NUMBER AND DESCRIPTION	ADDITIONAL COMMENTS
H	H-1 tentatively at 2+00S on L-14E Drill at -45° grid N for about 150 ft.	Line 14E does not actually extend to the area of conductor H, and the existence of the conductor should be verified with a Double Dipole before drilling. This conductor is previously untested.
I	I-1 at 7+00N on L-22E. Drill at -45° grid N for at least 250 ft.	This zone is fairly continuous over a length of 1,000 ft. Its location suggests a possible iron formation, but it has never been tested below surface for base metals.
K	K-1 at 0+50S on L-32E. Drill at -45° grid N for about 250 ft.	This is a poddy conductor, as yet untested.
L	L-1 at 5+60N on L-36E. Drill at -45° grid N for about 250 ft.	This conductor has a direct magnetic response. It is somewhat poddy in nature. A drill hole at its extreme west end intersected a small width assaying 0.24% Ni. There is no drilling elsewhere, but a Mining Corp trench on L-42E gave a 0.32% Ni assay over 30 ft.
O	0-1 at 37+50N on L-38E. Drill at -45° grid N for about 200 ft.	This conductor is long, poddy, and patchy with a direct mag response. It may have been tested by hole CN-25 around L-32E. However, this hole, if plotted correctly is in the wrong place for this conductor, and it may have been drilled toward the edge of the overburden trough at 44+00N on L-32E. In any event, the proposed hole is 1/4 mi east of CN-35, and the ultramafic rocks in the upper part of hole CN-25 are considered to be encouraging.
L_2 & L_3	L-2 at 12+00N on L-48E. Drill at about 350 ft.	Both conductors are directly magnetic As yet they are untested. A hole to test conductor L_2. However, with an extra 125 ft, conductor L_3 can be tested by the same hole.

about 350 ft. to test conductor L_2. However, with

WRITER'S DECLARATION

Neither I, nor John Betz Limited, have any financial interest in any of the properties of Utah Mines Ltd., or of its joint venture partners.

I hold B.A. (1952) and M.A. (1953) degrees in geophysics from the University of Toronto. I have worked full time in mining exploration geophysics since 1953, and two summer seasons prior to 1953.

All statements made in this report are correct to the best of my knowledge.

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MAXMIN II EM SYSTEM
OPERATIONS MANUAL
July 1977

1. THE TRANSMITTER

1.1. INSTALLATION AND CARRYING INSTRUCTIONS

1.1.1. The method of putting on the transmitter is pretty well self-evident. The battery-pack is installed on the lower back with the belt fastened fairly tightly around the waist, just above the hips. The console is installed on the chest with each cross-strap going under one armpit and above the opposite shoulder. The transmitter coil is next suspended from the shoulders. The retractile cables are then used to connect the battery box to the console.

1.1.2. For short walks, such as between stations in "easy" terrain, the coil is best left in its normal position. It can be kept from swinging with one steadying hand. For longer walks, such as between lines, or for short walks under "difficult" conditions, the coil is best cocked onto one shoulder. Additional carrying hints for rough terrain are given in section 4.6.

1.1.3. Before starting in motion the transmitter operator should take a tight hold on the reference cable with one hand. This is advisable, even when the safety clip is connected. When the transmitter operator is leading the procession, he will take undue strain off the safety clip by pulling the cable by hand. He will also avoid unpleasant surprises, such as can happen if the receiver operator gets suddenly into trouble. When the transmitter operator is following the procession, he will again be able to take undue strain off the safety clip, as well as restraining sudden forward jerks, by taking a tight hold on the cable before starting in motion.

1.1.4. Precautions should be taken to keep the coil windings at least 6 inches from the transmitter console and battery box. Failure to do this will jeopardize getting a full day's output from the transmitter.

1.2. BATTERY TEST

1.2.1. The "Batt-Test" button is depressed with the transmitter switch "On" and the coil kept away from large metallic objects, including the transmitter console and battery box.

1.2.2. When the meter needle reads below the "Batt OK" area on the dial, the batteries must be recharged in order to obtain valid data. The batteries should not be stored for any period of time in a discharged condition. They should be recharged before storage.

1.2.3. The battery test should be made at the lowest frequency used. This is where the maximum current drain occurs. Occasionally, however, it is done at all other frequencies as a check on the operation of the transmitter. A detuned coil and certain other malfunctions will result in a "low" test reading, even when the batteries are fully charged.

.3. TRANSMITTER OPERATION

1.3.1. A specimen of the transmitted signal in the intercom speaker indicates that the transmitter is "on". At the highest frequency of 3555Hz the specimen may not be clearly audible because the transmitter output is reduced with increasing frequency.

1.3.2. In the max- and min-coupled modes, the "Frequency" switch is turned to the osition dictated by the receiver operator on the intercom. The "On/Off" switch is then switched to "On" and the coil is tilted as dictated by the receiver operator.

1.3.3. In the vertical loop mode, the plane of the coil is held vertical (as indicated by a bubble level on the coil) and pointed toward the receiver operator. There is no intercom connection for this mode. Lung-power or a pre-arranged system of timing are the alternatives.

1.4. TRANSMITTER INTERCOM SYSTEM

1.4.1. In the max- and min-coupled modes, i.e. in the cable-linked modes, the intercom system is operational at all times. It is not dependent on the position of the "On/Off" switch. But, the transmitter operator will not be able to talk to the receiver operator, when the receiver is "On". An attempt to reach the receiver operator will cause the reference signal light to flicker, and the meter needles to bounce around. In this way, the receiver operator will be alerted.

1.4.2. To communicate with the receiver end, the Tx operator simply presses the "PTT" switch and talks about 20 cm from the microphone, which is located on the top panel. A normal speaking voice is recommended. Shouting may cause distortion. Of course, the "PTT" switch is released for listening.

1.5. TILT CONTROL

In-Line Modes (Max - and Min-Coupled)

1.5.1. The "Tilt" meter on the control console is electrically linked to a tilt-sensitive device inside the coil housing, and it indicates the in-line tilt of the plane of the coil in % grade of slope. The range of the tiltmeter is ±75% grade.

1.5.2. The "Tilt" meter has been installed for work in rough terrain. In flat terrain, where the plane of the transmitting coil is normally held horizontal, it is a little quicker to use the appropriate bubble level on the coil.

Vertical Loop Mode

1.5.3. The "Tilt" meter plays no role in this mode. There is a bubble level on the coil for keeping its plane vertical.

1.6. TX BATTERIES

1.6.1. Rechargeable gel cells are used in the transmitter. For heavy duty cycles two Globe GC 680 6 volt 7.5 Amp-Hr batteries are used. For light duty cycles one Globe GC1245 12 volt 4.5 Amp-Hr battery may be used.

1.6.2. The rate of battery discharge depends on the operating frequency, the ambient temperature, and the age of the batteries. The batteries discharge more rapidly at low frequencies and/or at cold temperatures. However, a full day of operation can be expected from a fully charged set of batteries, even under the most trying conditions

2. THE RECIEVER

2.1. INSTALLATION AND CARRYING INSTRUCTIONS

2.1.1. The proper way to put on the receiver console is with the carrying strap passing under the left armpit and over the right shoulder, or vice-versa. This permits day-long carrying without undue strain on the neck.

2.1.2. For short trips, such as from station to station in "easy" terrain, it is easiest to leave the receiver in its front-mounted position with a steadying hand on the lower part of one of the antenna rods. For long trips, such as between lines, or between stations in "difficult" terrain, it is best to slide the receiver unit into a side-held position, with a steadying hand on one of the antenna rods. The single shoulder strap makes for an easy change in position of the receiver unit. Additional carrying hints for extremely rough terrain are given in section 4.5..

2.1.3. Before starting in motion, the receiver operator should hold the reference cable firmly in one hand for the same reasons given in section 1.1.3.

2.2. BATTERY TEST

2.2.1. The batteries are tested with the receiver "On" and the 'Mode" switch first in the "Batt Test+ " position, and secondly in the "Batt Test-" position. If the tilt meter needle does not rise well above the low end of the "Batt OK" scale for either one of these tests, then the "low" batteries should be replaced.

2.2.2. If the "low" batteries are not replaced, they will very soon reach a point of depletion, where the "In-phase" and the "Out-of-phase" needles will "pin" off the fine scale in opposite directions, even with the transmitter off. At this point, the battery test will be misleading because it will indicate that the batteries are fully charged. However, if very large, constant in-phase and out-of-phase readings of opposite sign, e.g. -80% in-phase and +65%out-of-phase, are obtained for more than one station, a bad bank of batteries should be suspected--regardless of the indication of the test.

2.3. TAKING READINGS

Cable -Linked Modes

2.3.1. The "Frequency" switch is turned to the desired position 222, 444, 888, 1777 or 3555 Hz. The 'Mode" switch is turned to the desired position -'Max" (horizontal loop), 'Min" (minimum coupled). The "Separation" switch is turned to the appropriate distance position --- 25, 50, 100, 150, 200 or 250M, for example. The transmitter operator is told the desired frequency of operation and the coil tilt via the intercom. The "On/Off" switch is turned to "On" and the receiver is tilted to the slope determined either from secant chaining (see section 5), or from a direct inclinometer sighting.

2.3.2. The "In-Phase" and "Out-of-Phase" meters display the respective components of the anomalous field as a percentage of the primary field strength at the receiver. These readings will be absolute if the graduated "In-Phase" and "Out-of-Phase" compensator controls are locked in their central position, i.e. at the "5.00" mark on the dial, and the distance between the coils is correct.

2.3.3. The fine scales (-20%, 0, +20%) are normally in play. When a reading is beyond the range of the fine scale, the push-button to the right of the scale is depressed. This converts the range of the scale from -20, 0, +20 to -100, 0, +100 (%).

2.3.4. Before moving to the next station the receiver operator instructs the transmitter operator to switch to "Off". The receiver operator then switches "Off" to save batteries, and perchance the transmitter operator wishes to communicate with him. There will be more on this point in section 2.5.

Vertical Loop Mode

2.3.5. The 'Mode" switch is turned to 'V.L.", the "Frequency" switch is turned to the desired position, and the "Separation" switch is turned to the appropriate distance position. There is no intercom system in this mode. Lung-power, or a pre-arranged time schedule, are necessary to co-ordinate the efforts of the receiver and the transmitter operators.

2.3.6. The "Tilt" meter is graduated in "% grade" rather than in "degrees". This means that the readings are the tangent of the angle contained by a horizontal plane and the turns of the receiver "at null", multiplied by 100. This is a close approximation to the vertical in-phase component of the secondary field, as a percentage of the primary field strength at the receiver.

2.3.7. The null position of the receiver is found by observing the "In-Phase" meter. The "null" is indicated by a minimum reading on the "In-Phase" meter. The sensitivity of the nulling meter can be changed by the "Separation" switch. When this switch is set in the same position as the actual coil spacing, tilting the receiver for maximum coupling with the transmitter will give a 100% reading on the "In-Phase" meter, in a neutral area. With this setting of the "Separation" switch, the "In-Phase" meter reading at "null" is a measure of the 'ellipticity x100' of the total field at the receiver. This is a first order approximation of the out-of-phase component of the secondary field along the axis of the receiving coil, as a percentage of the primary field strength at the receiver. However, the polarity of the out-of-phase component cannot be determined in this mode of operation. All values are positive. Under "noisy" conditions, the "In-Phase" meter time constant becomes longer, and the "nulls" are more time consuming to obtain.

<u>Auxiliary Mode</u>

2.3.8. The "Mode" switch is turned to "AUX" for this mode. In this mode, the turns of the transmitter are held horizontal, while those of the receiver are tilted about the vertical for "null". When used in-line, this mode is akin to the min-coupled mode, without cable link.

2.4. CALIBRATION AND PHASE MIXING TESTS

2.4.1. It is a good practice to check the calibration and the amount of phase mixing in the receiver each day. It is recommended to do this upon starting in the morning, around mid-day and upon finishing in the evening. The procedure is to move the "In-Phase" potentiometer 5 turns clockwise, or counter-clockwise, for each frequency in use and to note the in-phase and out-of-phase readings before and after the move. A typical example would be:

	IN-PHASE	OUT-OF-PHASE
Before	-4%	-2%
After	+45%	-½%

2.4.2. Ideally, the in-phase reading should change by 50% for 5 turns, and the out-of-phase not at all during this test. The fact that this is not always the case can be of assistance in interpreting the results. Precautions should be taken to <u>lock</u> the potentiometer control in its central position (5.00) after this test.

2.4.3. Phase mixing in the extent of 1% to 2% out-of-phase per 50% change in the in-phase will not cause serious interpretational errors. However, a large amount of phase mixing could affect the interpretation more seriously, and it should be removed before proceeding with the survey.

The procedure is first to remove the outer can of the receiver, as for changing the batteries. The removal of the outer can will expose a slot in the side panel, under the base of the left antenna rod. The numbers 35, 17, 8, 4, and 2 under this slot are abbreviations of the five system frequencies. A jeweller's screwdriver is inserted to turn the appropriate frequency potentiometer until the out-of-phase reading, following the 5-turn 50% in-phase change, is the same as it was before the change.

2.4.4. Should it not be convenient to remove the phase phase mixing as just described, corrections to the readings can be made as follows: If the phase mixing tests show a change of -7% out-of-phase for a calibration change of +50% in-phase, then it would follow axiomatically with this equipment that there would be a +7% in-phase chang for a change of +50% out-of-phase. So, an anomalous reading, which appeared to be -40% in-phase and -60% out-of-phase, would be in error by the fact that the in-phase reading would be pushed in the negative direction by the anomalously negative out-of-phase reading, while the out-of-phase reading would be pushed in the positive direction by the anomalously negative in-phase reading. So the true in-phase reading would be $-40\% + (60/50) x 7\% = -32\%$ approximately, and the true out-of-phase reading would be $-60\% - (40/50) x 7\% = -65\%$ approximately. Corrections of this magnitude affect the depth and conductivity -thickness estimates.

2.4.5. If the level of phase mixing is not kept small, then the topographic gradient will be reflected in the out-of-phase readings, when working on secant-chained lines. This point will be elaborated upon further in subsection 5.15.

2.5. RECEIVER INTERCOM SYSTEM

2.5.1. The receiver operator can reach the transmitter operator at any time, as long as the reference cable is connected. He simply presses the "PTT" switch and talks, releasing it when the time comes to listen.

2.5.2. The receiver operator will only be able to hear the transmitter operator when the receiver "On/Off" switch is in the "Off" position. Nonetheless, the receiver operator will be aware of attempts to reach him, when the "On/Off" switch is in the "On" position, as described in sub-section 1.4.1. It would be more convenient to be able to receive the transmitter operator's spoken word at all times. But, there are reasons for not making this possible, which relate to eliminating "stray coupling" and interference effects from the readings.

2.6. TILT CONTROL AND MEASUREMENT

2.6.1. A tilt sensitive device inside the receiver is electrically linked to the tiltmeter, which is mounted in the most convenient position for viewing. The device is only sensitive to tilting in the direction perpendicular to the plane containing the two receiver antennas, or perpendicular to the long dimension of the "Tilt" meter.

2.6.2. When the "Mode" switch is in the "Max" or the "V.L." position, the "Tilt" meter scale references the turns of the receiving coils to a horizontal plane.

When the "Mode" switch is in the "Min" or the "Aux" position, the tiltmeter scale references the turns of the receiving coil to a vertical plane.

2.6.3. The "Tilt" meter scale is graduated in "% grade". The reason for using this unit, rather than the conventional "degree", will become more apparent in Section 5, which deals with secant line chaining. In brief, the use of the % grade unit permits the direct calculation of a topographic profile from the chaining notes. Furthermore, the mean slope between the two coils can be calculated directly by summing and averaging the slope values over the number of station intervals between the coils, when working in % grade. This cannot be done directly when working in degrees--except for small values. For example, a rise of 100% grade (45^{o}) over one station interval, followed by a rise of 0% grade (0^{o}) over the next station interval, would give an average of (100%+0%)/2 = 50% grade (26.6^{o}). A simple arithmetic average of 45^{o} and 0^{o} slopes is 22.5^{o}, which is 4.1^{o} less than the true average. The significance of working in % grade rather than in degrees in the vertical loop mode has already been described in sub-section 2.3.6.

2.6.4. For the Max-coupled mode, the receiver unit is suspended in front of the operator as per section 2.1.2., with its antenna rods pointing upwards. The final adjustment to the tilting are made with one or two hands on the lower part of the antenna rod(s), or on the side(s) of the carrying case.

2.6.5. For the min-coupled mode, the receiver carrying case is held on each side and the entire ensemble is raised, so that the antenna rods point backwards over the shoulders. Final tilting adjustments are made from this position. The single carrying strap slides easily across the shoulders when making the mode change.

2.6.6. For the vertical loop mode, the receiver unit can be held as in 2.6.4. However, the operator must then face <u>perpendicular</u> to the line joining himself to the transmitter, before tilting the receiver back and forth for a signal null, or a minimum. As stated in section 2.3.7., the latter position is indicated by a minimum reading on the "In-Phase" meter. The operator may choose to hold the receiver otherwise for the vertical-loop mode, but he must always bear in mind that the tilt-sensitive device only "works" when the coil is tilted in a direction <u>perpendicular</u> to the long dimension of the "Tilt" meter scale.

2.7. BATTERIES

2.7.1. The receiver is powered by four small 9 volt radio batteries (NEDA 1604A or 1604). For cold weather operation, the alkaline type, Mallory MN-1604 or Eveready No.552 is recommended. For warm weather operation either the carbon-zinc or the alkaline type can be used. The batteries are paired electrically into two separate 18 volt banks, one for the negative voltage and the other for the positive.

2.7.2. The battery life depends on the ambient temperature and on the amount of "on" time. A set of new alkaline batteries will last for at least two days of very cold weather operation and for two weeks of warm weather operation. Carbon-zinc batteries may not last for a full day of operation in cold weather; however, they will last a few days in warm weather.

2.7.3. The outer case of the receiver console must be removed in order to replace the batteries.

2.8. RECEIVER WARNING LIGHTS

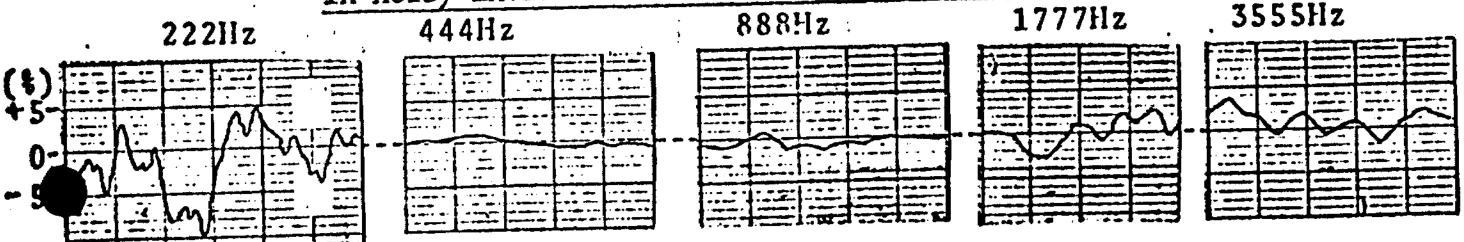
2.8.1. The "S" (signal) light indicates when the noise signals received by the antenna coils are strong enough to affect the validity of the readings. If the light flickers the odd time, the readings will be quite valid. If it goes on steadily, or near-steadily, the readings will be invalid. This usually only happens very near to a powerline.

2.8.2. The "R" (reference) light lights up when no reference signal is arriving at the receiver. This can be due to a break or a short circuit in the reference cable, to a non-functioning transmitter, or to the transmitter operator trying to use the intercom system during the transmitting cycle. It may be noticed, when working near dusk that the reference light glows very dimly, especially at the lowest frequency. This is normal. Only a bright light signifies trouble during the transmitting cycle. The odd quick flash of the reference light can be caused by external noise sources, but this will not affect the readings. Occasionally, water plus dirt in the reference cable connectors may cause the light to come on, particularly when using the higher frequencies. If this is suspected, then the connectors should be cleaned by a small brush.

2.8.3. Both the "S" and "R" lights are sheltered from bright daylight by the protruding upper housing of the "Out-of-Phase" meter and the operator's body. This position of the lights makes it easier to determine if they are illuminated on a bright day. At the same time, it can lead to their being obstructed by a bulky coat. For this reason, the operator should tuck in the pucker from time to time.

2.8.4. It will be found sometimes that the "In-Phase" and Out-of-Phase" meter needles are quite "active" with little or no visible flashing of the "S" light. This is particularly the case when working at 222 Hz with large coil spacings in areas of strong power line or spheric noise. Nonetheless, as long as the "S" light is essentially off, a good reading can be obtained by averaging the needle fluctuations . By way of demonstrating the point, a chart recording of the fluctuations of one of the meter needles about the "0" background level is shown for a very noisy area.

Typical Patterns of In-Phase and Out-of-Phase Meter Needles in noisy Environment for a Coil Spacing of 200 Meters.



Time: 4seconds per division.

Clearly, an experienced operator would be able to make an accurate average (±1%) of the needle fluctuations at all frequencies even under such noisy conditions. However, more time would be required at 222Hz than at the other frequencies.

3. POTENTIAL PROBLEM AREAS NOT COVERED IN THE PRECEEDING SECTIONS

3.1. HUMIDITY IN THE RECEIVER CONSOLE

Although the receiver circuit boards have a protective coating, persistently high humidity levels in the receiver console can lead to invalid readings. When working under prolonged humid or wet conditions, the outer cover of the receiver should be removed every evening, and the unit should be suspended for two or three hours above a gentle heat source, such as a gasoline lantern. Care should be taken not to overheat the components.

3.2. HUMIDITY IN THE TRANSMITTER CONSOLE

Although the transmitter circuitry is less affected by humidity than the receiver, it is advisable to remove the outer case, and to treat the transmitter console in the same manner as the receiver.

3.3. HUMIDITY IN THE METERS

Humidity in the meters is usually concurrent with humidity in the consoles. It can cause the meter needles to stick against their stops. This will necessitate tapping the meters to free the needles. This problem will depart with the drying of the console; although a little more drying time may be required for the meters.

3.4. STATIC CHARGE ON THE METER COVERS

Under extremely dry conditions, hot or cold, the meter covers can take on a static charge if brushed by a sleeve or glove, etc. This charge can be strong enough at times to cause the meter needles to "lock" under it. This will be apparent to the operator, if he is watching the meters closely over the entire "On to Off" interval. Such a charge can seriously affect the readings, and it should be bled off by either breathing on the cover, or by running a damp finger across it.

3.5. SOLIDLY STUCK METER NEEDLES

A sharp knock at a given moment such as can happen during transportation, can cause a meter needle to stick firmly somewhere along the scale. It can usually be freed by a persuasive tapping in different directions around the meter.

3.6. DAMAGE TO CABLE AND CONNECTORS

3.6.1. Cable and connector damage can result from winding up the reference cables with the loose end unattended. A sudden snagging of the connector or safety ring will eventually take its toll. A more serious problem, as far as the cable itself is concerned, is its propensity to self-twist in any area where slack develops. This propensity to self-twist increases with time, unless the cable is untwisted occasionally. If the twist is loose, it will "pop" open when a little tension is applied to the cable. However, if the twist has become tight, it will not "Pop" open under tension. The cable tightens further onto itself, and eventually it starts to cut itself. With this sort of action the life of the cable will be very short.

3.6.2. Collecting an armlength of cable at a time, and letting it dangle freely while the next armlength is brough in, will result in many self-twisted sections. In the latter case, appreciable time will be required to untwist the cable manually when paying it out the next day. If not, the "end" of the cable will be close at hand.

3.6.3. To prevent self-twisting, the cable should be collected in a figure "8" around the elbows, then it should be tied immediately at each end and in the center of the "8" with lampwick, cord, or flagging. No twists will occur when unwinding a figure "8", if there is always a little forward motion with each loop paid out.

3.6.4. If, during the course of normal operation, the propensity to self-twist tightly becomes evident when a little slack develops at either end, then the operator(s) should take a minute to disconnect and untwist the cable. A thorough untwisting will last for the duration of the day, or longer.

3.6.5. Cable and connector damage can be repaired in the field with a sharp knife, a roll of tape, and a few spare parts. A bad section of cable can be cut out and the good ends spliced and taped together without the benefit of solder. A protective knot below the splice will keep it from pulling apart. Such a knot will not impair normal operation, if near the end of the cable. A break inside the connector can be handled by splicing in a spare connector with a presoldered length of cable. In splicing, care should be taken not to reverse the colour-coded conductors. A safety eye can be inserted quite readily in the field.

3.7. RECEIVER IN CLOSE PROXIMITY TO A FUNCTIONING TRANSMITTER

3.7.1. Care should be taken not to switch the transmitter on if the receiver is within 10 feet of the transmitting coil.

Failure to observe this precaution may result in damaged protection diodes and input capacitors in the receiver and subsequent chargeable service work. Of course, the damage will not occur if the receiver and transmitter are on different frequencies. It is therefore a good practice for the receiver operator to switch to another frequency after the last reading of the day and before approaching the transmitter.

3.8. STRAY COUPLING EFFECTS

3.8.1. Through the use of balanced circuitry, the MaxMin II is essentially free of stray-coupling effects between the transmitter and the receiver. However, there is still a danger of small spurious readings when working with large cable lengths and high frequencies in wet uneven terrain, i.e. of varying topographic or varying overburden thickness. These spurious readings can be avoided if the receiver operator does not touch any metallic parts of the console, or the upper part of the antenna rods, during the course of the readings. Following these instructions is particularly important if the receiver operator's feet are wet.

3.8.2. Connectors which become wet between the pins and the housing, such as might happen if dragged across an open swamp, can also lead to spurious readings at large cable lengths and high frequencies. A quick drying with a handkerchief, or shirt tail will obviate such problems.

3.9. OPERATING IN THE MIN-COUPLED MODE

3.9.1. Small errors in the coil tilts do not affect the max-coupled readings. However they do affect the min-coupled readings. For this reason, care must be taken with the "Tilt" meter readings, when operating in the min-coupled mode. One method of getting consistent tilt control in the latter mode is to bring the "Tilt" meter needles to their final position always from the same direction. This procedure will make consistent the small errors due to friction in the tilt-sensitive devices.

3.9.2. In flat terrain, the min-coupled mode can be operated more quickly by the use of bubble levels at both ends. The transmitter is already set up for such operation with its built-in bull's-eye bubble. With the receiver, an easy solution is to tape a small line-level (available in any hardware store) just above the base of one of the antenna rods.

3.10. OPERATING IN TERRAIN CONTAINING SWAMPS, CREEKS, AND RIVERS

3.10.1. Open swamps or creeks need not destroy the continuity of a profile. It is often possible to ford such obstacles by moving sideways with the cable to a passable area, then flicking the cable back in line. Another method is to attach a weight to the end of the cable and to pitch it across the open water, catching up to it after making a detour. The trailing end of the cable is later dragged across the same open water. After such an operation, the instructions of sub-section 3.8.2 should be carried out

3.10.2. A wide river traversing a property need not destroy the continuity of a profile if it is possible to bring a boat to the river. The boat is used to ferry each operator in turn across the river. In this way, a continuous profile can be had, generally without missing more than one station in the line.
However, this system is most practicable with a third man on the crew. When not acting as boat captain, he can become chief data recorder, making for a very efficient operatio

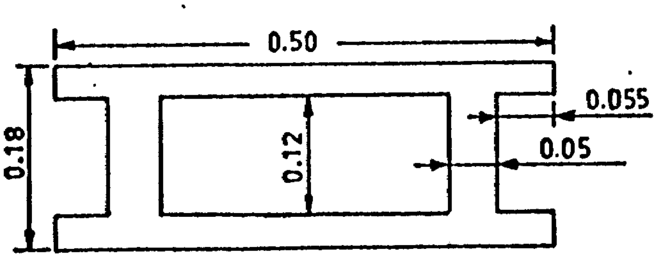
4. OPERATING IN ROUGH TERRAIN

Cable – Linked Methods

4.1. The method of operating in rough terrain depends on the desired in-phase noise level. To get the maximum search-depth capabilty out of the system when looking for "good" bedrock conductors, it is necessary to have low in-phase noise. To have low in-phase noise, it is necessary to secant chain the lines. The method of secant chaining is described in section 5.

4.2. One result of secant chaining is that all stations are equally spaced on the horizontal plane. As a result, the distance between the coils changes as the mean-slope changes. It is always greater than the nominal coil spacing; so cables considerably longer than the nominal length are required in rough terrain. The length of cable required can vary from being a little more than the nominal coil spacing to very much more, as the mean-slope steepens.

4.3. A satisfactory way to handle widely varying slopes is to use the next longer cable than horizontal distance between the coils. In other words, if a nominal 400ft or 600ft coil spacing is desired, then 600ft or 800ft cables, respectively, should be used.
With a light-weight winder, it is easy to take up or pay out cables as the need arises. A sketch of a very satisfactory winder is shown below. It is economical to make and easy to use. It can be used to collect the cable at the end of the day. It is easy to carry in a pack sack, with or without cable.



3/4" plywood

All dimensions in meters.

4.4. In rough terrain, it is desirable to have a three-man crew. The third man should be at the leading end of the cable in choppy terrain and on long up-slopes. He should be at the trailing end on long steep down-slopes. When at the leading end, he would look after the winder and pull, or help to pull, the cable. Under very difficult climbing conditions, it works out well for the leading coil operator to disconnect the cable and to move independently of the winder operator between stations. The winder operator can quickly collect 6 to 10ft lead between himself and the leading coil and climb toward the next station. The leading coil operator can hang back briefly and help with the pulling, before finding his way to the next station. This is more practicable if the receiver operator is leading, because he is less encumbered than the transmitter operator.

4.5. The trailing operator may find it preferable to disconnect the cable between stations when faced with a particularly "tricky" climb. It is preferable that he hold the loose end as much as possible, letting it go only when he needs both hands for climbing. Should the cable snag ahead of him, he will be able to free it, when he catches up.

4.6. For very steep climbs with the receiver, it is preferable for the operator to slide it completely around to his back, using a steadying strap around his waist to keep it from swinging out when he leans sideways. A piece of lampwick passing loosely around the waist from one side of the carrying case to the other has been found to be a very satisfactory strap. It slides easily as the operator changes the position of the receiver.

4.7. For steep climbs with the transmitter, it is preferable to hang the coil from one shoulder. This frees both hands. From time to time, the climbing may be difficult enough to warrant disconnecting and handling the coil separately.

4.8. When operating on long steep down-slopes, one man can handle both the coil and the winder at the leading end, because virtually no pulling force is required. The force of gravity and the low-friction properties of the cable make it self propelling down steep slopes. The receiver operator, with fewer initial encumbrances than the transmitter operator, is best suited to handle the winder at the leading end of the cable.

4.9. At the trailing end of the cable, there is some danger of the equipment operator being jerked forward when in difficult places, in spite of the presence of an intercom system. This is especially true for the transmitter operator, because he is more encumbered than the receiver operator. The third man can stay just ahed of the equipment operator, restraining the cable and helping the equipment operator as he sees fit. Alternatively, the third man can disconnect and take full responsibility for the end of the cable, leaving the equipment operator completely completely free to find his own way down. Looking after the free end of the cable is a responsible job. The third man needs to let it get away only once to understand fully the meaning of this statement.

4.10. There are many variations on the basic themes just outlined. For instance, in going from a steep down-slope to a flat area, the third man can transform from chief cable engineer to chief data recorder, in order to give the operation maximum efficiency.

4.11 When working on consistently steep ($\geq$ 40% grade) secant chained slopes, it will be found that the in-phase readings are beyond the negative end of the fine scale. To enjoy the added precision of reading on the fine scale and to avoid the nuisance factor of using the "100% IP Range" button for every reading, the "In-Phase" potentiometer can be moved from its normal position of 5.00 to 7.00 or 7.50. This move will make the in-phase level 20 or 25% more positive, putting the majority of the readings on the fine scale. Of course, this level change will have to be taken into account when plotting the results.

Vertical Loop Method

4.12 It is inherently difficult to get noise-free vertical loop results in rough terrain. Aligning the transmitter on the receiver operator's voice can lead to large misorientation errors due to reflections of the voice from topographic features. The use of an orientation board on a cut grid holds some potential for clean data. However, it will not necessarily improve the situation much, unless the location and direction of the lines, and the exact location of the stations along the lines, are known in advance. This, of course, is only possible from complete secant chaining of the grid. This method of chaining is described in the next section.

5. SECANT CHAINING AND SUBSEQUENT DATA REDUCTION

5.1. The secant method of chaining has been devised for acquiring clean in-phase data in choppy and mountainous terrain, i.e. in terrain where marks on a taut cable will no longer serve as a guide to an accurate coil spacing. Secant chaining is done with a Suunto PM5/SPC inclinometer, which has a "%grade" and a "Modified Secant" scale (secant x 100) -- hereafter called the "Secant" scale. The latter scale states the number of units along a slope per 100 units of horizontal distance. The "%grade" scale is visible simultaneously with the "Secant", and it states the number of units along the vertical per 100 units of horizontal distance. Other features of this inclinometer are that it is very small, single-hand-held, self-levelling, and oil-damped, with an optically magnified scale.

5.2. The Suunto inclinometer is not a precision instrument in the sense of a surveyor's level. The true "zero" position is usually within ¼% grade of "zero" on the scale, but each operator introduces his own bias to the instrument. This bias relates to superimposing the horizontal reading line, seen with one eye, onto an object seen with the other eye. Even with both eyes on the same horizontal plane, superimposition errors still occur. These errors vary from person to person.

It has been found that the cumulative error is generally in the positive direction at the rate of ½ to 1 unit per 100. In the light of this, any inclinometer operator using one of these inclinometers for the first time should make a reversed - position shot on his chaining partner over the distance of a station interval. With this, the inclinometer operator will know whether or not he should be aiming above or below the equi-height mark on his chaining partner.

5.3. The specific procedure in the secant method of chaining depends upon the desired end result. For an accurate MaxMin II survey, it is only necessary to secant chain along the traverse lines. If an accurate plan of the grid with topo contours is desired, then it is necessary to secant chain between the ends of the lines. No specifics will be given here on making topographic contour maps from chaining data, other than to say that the chaining must be done in closed loops and accumulated errors corrected back through the loops. Infact, the procedure is akin to that for a controlled magnetic or gravimetric survey, except that corrections are pro rated by distance rather than time.

5.4. The in-phase accuracy of the MaxMin II results depend upon the accuracy of the chaining along the traverse lines; whereas, the accuracy of the grid plan depends also on the accuracy of the chaining between the ends of the lines. A random chaining error of a percent or two will have a perceptible effect on the MaxMin II in-phase results, whereas it will not on the grid picture. So, the chaining along the traverse lines must be quite accurate, while the chaining between them can be less accurate. In fact, cut lines are not required for chaining between traverse lines. With a good compass course, it is easy to keep the chain reasonably straight. However, the inclinometer operator does require a line of sight to his helper on the chain.

5.5. A good compass course between the ends of the traverse lines will permit back-chaining without large misclosures at the other end of the line. In fact, misclosures of greater than one meter will not be due to deficiencies in the secant chaining method but to errors in the course followed between the lines. Nonetheless, misclosures at the end of a line -- or in the center, if the baseline is located there -- need not be a cause for subsequent mapping problems if shown in plan as they occur in the field. As far as accurate MaxMin II data is concerned, it is only necessary to know the horizontal-plane position and the elevation of each station along the traverse line.

5.6. A practical example of using the Suunto PM5/SPC inclinometer follows: The inclinometer operator sighting on his helper up a slope reads "105" on the "Secant" scale. This means that he should pay out 1.05 times the desired chaining interval. If this interval is 100 feet, he should simply pay out 105 feet of chain. He holds the "105" mark vertically above the "0" mark on the chain. The picket should be driven well or there's little point to this type of chaining. While the helper is writing co-ordinate information on the picket, the inclinometer operator records in his note-book both the secant reading and the corresponding % grade reading (+32).

In this way there is no "dead time and the chaining goes quickly.
Recording each secant reading may appear redundant after it has been applied to the chain. However, a quick visual check of the two recorded readings in the book, against a reference "secant - %grade" table clipped into the book, will alert the operator to the inevitable reading error. An example of this type of table is shown below:

Secant:	%Grade:	Secant:	%Grade:
100	0	118	63
100½	10	119	64½
101	14	120	66½
102	20	122	69
103	24½	124	73
104	28½	126	77
105	32	128	80
106	35	130	83
107	38	132	86
108	41	134	89
109	43½	136	92
110	46	138	95
111	48½	140	98
112	50½	142	101
113	52½	144	104
114	55	146	107
115	57	148	109
116	59	150	112
117	61		

5.7. During the distance measurement, the chain is always held parallel to the slope, e.g. head-to-head, waist-to-waist, hip-to-hip, boot top-to-boot top, at a constant tension.
On steep slopes, a piece of talus dropped from the mark on the chain will improve the precision of the measurement on the ground.

5.8. Where obstructions in the line impede a full 100ft measurement with the chain, then only a fraction of the secant value seen on the inclinometer scale should be given on the chain. Suppose for instance, that the operator at the "0" end of the chain can only get 3/4 of the way to his next position before passing out of sight, and at this time the secant scale reads "105"; then, the trailing operator should hold the chain at "105 x 0.75 = 78.8", making for an exact 75ft (horizontal) shot. The corresponding %grade value (i.e. +32) seen on the inclinometer scale is recorded directly into the book, as well as the horizontal distance of the shot. The following measurement would then be only 25ft (horizontally), e.g. 108 x 0.25 = 27 ft for a secant reading of 108, with corresponding %Gr value (-41) and distance recorded in the note book.

5.9. If when backchaining to the base line, the final shot from picket 1+00 (N,S,E or W) to the base line picket is on a slope, then an inverse calculation is required to get the horizontal distance to the base line. For example, if the distance on the chain is 128.5ft, and the inclinometer shows secant and %grade values of 107 and -38 respectively, then the true horizontal distance is given by the expression 128.5/1.07 = 120ft, and the elevation difference is given by the expression -38 x 1.2 = -46ft. Of course, the foregoing calculations are only necessary when closing a chaining loop at the base line.

When chaining past the base line, it is best to continue the chaining from the "0" picket and not the base line picket, so that all stations are 100ft apart. Although the base line picket would not be used during the EM coverage in a situation like this, it is a good practice to note its location on the way by. With this, the stations on the line can be accurately plotted with respect to to the base line.

5.10 In the metric system, there are usually 25 meters horizontally between stations, which means that an extra calculation must be made on the inclinometer data. One way around this is to subdivide 25 meters of distance on the chain into 100 equal parts numbered 1 to 100. So, a 50 meter chain would be subdivided into 200 equal parts numbered 1 to 200. With this, the inclinometer is used directly, and the operator turns grey less rapidly.

5.11 The most efficient way to reduce the chaining notes is to calculate first the topographic elevations from the % grade values. To start with, a quick perusal should first be made through the notes for all chaining intervals of other than 100 feet before any other calculations are made. For instance, the +32% grade figure of subsection 5.8. would convert to +24 feet over the 75 feet horizontal distance of the two shots. Of course, when the shots are a full 100 ft, the % grade figure is the vertical distance between stations in feet, and the % grade can be used without conversion.

5.12 It is an easy matter to derive the mean slope between the coils from the topo elevations. If a nominal coil spacing of 600ft. is to be used, then the elevation difference between stations 600ft apart is divided by "6". For instance if the leading coil in the procession is at station 6+00N on a line while the trailing coil is at the base line station, and the elevation of station 6+00N is 54 ft while that of the base line station is 100ft, then the mean slope between the coils is given by the expression (54-100)/6 = -8 % grade.

5.13 If due to a back-chaining error, the distance between the base line and station 1+00 (N,S,E, or W) is 120ft --- and the chaining has been continued to the other side of the base line from the base line picket rather than the "0" picket --- then the distance between the coils will be 620ft when they are straddling the chaining error. This distance will have to be taken into account when calculating the mean slope between coils, and also in correcting for the large-coil-spacing error. The calculation for the mean slope in the section above becomes (54-100)/6.2= -7% grade.

5.14 The corrections to the in-phase reading, for the slope of -7% grade and the 620ft horizontal distance between the coils, are +0.5% and +9.5%, respectively. These values are taken from the correction table on ~~the following~~ page 20.

5.16. The widely varying in-phase readings, associated with a widely varying secant chained slope, will reflect in the out-of-phase reading, if there is appreciable phase mixing in the system. This of course can be corrected arithmetically. But, it's much less time consuming to open the receiver and remove the problem as per subsection 2.4.3., than to correct the ~~out-of-phase readings.~~ phase mixing errors.

5.15 An additional correction is required for the in-phase and out-of-phase readings, but it is only of consequence if an anomaly is present. This correction is in the form of a multiplication factor, ~~and~~ which can be found in the table on page 20. The multiplication factors, for the slope of -7% grade and the 120 ft horizontal distance between the coils, are x 1.007 and x 1.103, respectively.

CORRECTION TABLES

Rough Terrain Table

Mean % Grade Between Coils	In-Phase *only* Correction for Coplanar Coils	*In-Phase & Out-of-phase correction*	Mean % Grade Between Coils	In-Phase *only* Correction for Coplanar Coils	*I.P.& O.P. Corr*	Mean % Grade Between Coils	In-Phase *only* Correction for Coplanar Coils	*IP&OP Corr.*
±0	+0							
1	0		±26	+9	X1.102	±51	+29.5	X1.415
2	0		27	10	1.111	52	30	1.443
3	0		28	10.5	1.120	53	31	1.450
4	0		29	11	1.128	54	32	1.467
5	0.5	X1.004	30	12	1.139	55	32.5	1.486
6	0.5	1.006	31	13	1.147	56	33.5	1.505
7	0.5	1.007	32	13.5	1.158	57	34.5	1.526
8	1	1.009	33	14.5	1.168	58	35.5	1.545
9	1	1.013	34	15	1.178	59	36	1.561
10	1.5	1.014	35	16	1.189	60	37	1.586
11	1.5	1.018	36	16.5	1.200	61	38	1.607
12	2	1.021	37	17.5	1.213	62	38.5	1.630
13	2.5	1.025	38	18.5	1.223	63	39.5	1.650
14	3	1.03	39	19	1.236	64	40	1.669
15	3.5	1.034	40	20	1.249	65	41	1.697
16	3.5	1.039	41	21	1.263	66	42	1.719
17	4	1.044	42	21.5	1.275	67	42.5	1.744
18	4.5	1.049	43	22.5	1.289	68	43.5	1.768
19	5	1.054	44	23.5	1.305	69	44.5	1.794
20	5.5	1.061	45	24	1.318	70	45	1.820
21	6	1.066	46	25	1.334	71	46	1.844
22	7	1.073	47	26	1.348	72	46.5	1.871
23	7.5	1.080	48	27	1.365	73	47.5	1.897
24	8	1.087	49	27.5	1.381	74	48	1.925
25	8.5	1.096	50	28.5	1.398	75	49	1.953

Correction *to in-phase only* $= +\left[1 - \left\{\cos.\tan^{-1}\left(\frac{\%Gr}{100}\right)\right\}^{3}\right] \times 100$ *Correction to IP&OP* $= X\left\{1/\cos\left(\tan^{-1}\frac{\%Gr}{100}\right)\right\}^{3}$

Note: Rough terrain corrections are always positive, no matter the sign of the slope.

Short and Long Coil Spacing Table

	Coil Spacing				Correction *to in-phase only*	*Correction to IP&OP*		Coil Spacing				Correction *to in-phase only*	*Correction to IP&OP*
Nominal	600	400	300	200			Nominal	600	400	300	200		
Actual	600	400	300	200	0		Actual	600	400	300	200	0	
"	602		301		+1	X1.01	"	598		299		-1	X0.990
"	604		302		+2	1.02	"	596		298		-2	0.980
"	606	404	303	202	+3	1.03	"	594	396	297	198	-3	0.971
"	608		304		+4	1.041	"	592		296		-4	0.961
"	610		305		+5	1.051	"	590		295		-5	0.952
"	612	408	306	204	+6	1.061	"	588	392	294	196	-6	0.942
"	614		307		+6.5	1.072	"	586		293		-7.5	0.933
"	616		308		+7.5	1.082	"	584		292		-8.5	0.924
"	618	412	309	206	+8.5	1.093	"	582	388	291	194	-9.5	0.915
"	620		310		+9.5	1.103	"	580		290		-10.5	0.906

Correction *to in-phase only* $= +\left[1 - \left(\frac{\text{Nominal Coil Spacing}}{\text{Actual Coil Spacing}}\right)^{3}\right] \times 100$ *Correction to in-phase & out-of-phase* $= X\left(\frac{\text{Actual coil spacing}}{\text{Nominal coil spacing}}\right)^{3}$

Note: Corrections are positive for long coil spacings, and negative for short coil spacings.

File ______

Ontario

Ministry of Natural Resources

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) Geological,Magnetometer,Electromagnetic,Topographic

Township or Area Eldorado

Claim Holder(s) Utah Mines Limited

Survey Company Utah Mines Limited

Author of Report Louis Godbout

Address of Author 488 Martin Ave.,Timmins, Ontario

Covering Dates of Survey Sept. 1, 1977-August 30, 1978
(linecutting to office)

Total Miles of Line Cut eighty-five

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
–Electromagnetic	20
–Magnetometer	20
–Radiometric	
–Other	20
Geological	40
Geochemical	

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer ______ Electromagnetic ______ Radiometric ______
(enter days per claim)

DATE: ______ SIGNATURE: ______
Author of Report or Agent

OFFICE USE ONLY

Res. Geol. L.D. Qualifications on this file

Previous Surveys

File No.	Type	Date	Claim Holder

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
P	453327
P	453328
P	453329
P	453330
P	453331
P	453332
P	453333
P	453334
P	453335
P	453336
P	453337
P	453338
P	453339
P	453340
P	453341
P	453342
P	479020
P	479021
P	479022
P	479023
P	479024
P	479025

If space insufficient, attach list

TOTAL CLAIMS 63

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS -- If more than one survey, specify data for each type of survey

EM + Topo-4167

Number of Stations 4167 Number of Readings Magnetometer - 8234

Station interval EM + Topo-100'; Magnetometer-50' Line spacing 200' north of B.L; 400' south of BL

Profile scale Horizontal 1"=200'; Vertical-(Mag. 1"=500 γ), (E.M. 1"=20%), (Topo 1"=200')

Contour interval Topographic - 10', Magnetometer 250 γ

MAGNETIC

Instrument MV - 1 Fluxgate made by Phoenix Geophysics of Toronto

Accuracy -- Scale constant 5gammas

Diurnal correction method Constant diurnal variance during Base Station checkin interval

Base Station check-in interval (hours) 1.5 - 2.5 hours

Base Station location and value Line 10 + 00E, 20 + 00N, 601 gammas

ELECTROMAGNETIC

Instrument MaxMin II made by Apex Parametrics Ltd. of Markham

Coil configuration Coplanar mode (horizontal loop)

Coil separation four hundred feet

Accuracy 0.5% of primary field

Method: ☐ Fixed transmitter ☐ Shoot back ☒ In line ☐ Parallel line

Frequency 222 Hz and 1777 Hz
(specify V.L.F. station)

Parameters measured Inphase and out of phase components of secondary field.

GRAVITY

Instrument

Scale constant

Corrections made

Base station value and location

Elevation accuracy

INDUCED POLARIZATION
RESISTIVITY

Instrument

Method ☐ Time Domain ☐ Frequency Domain

Parameters -- On time Frequency

-- Off time Range

-- Delay time

-- Integration time

Power

Electrode array

Electrode spacing

Type of electrode

SELF POTENTIAL

Instrument ______ Range ______

Survey Method ______

Corrections made ______

RADIOMETRIC

Instrument ______

Values measured ______

Energy windows (levels) ______

Height of instrument ______ Background Count ______

Size of detector ______

Overburden ______

(type, depth – include outcrop map)

OTHERS (SEISMIC, DRILL WELL LOGGING ETC.)

Type of survey Topographic (secant chaining)

Instrument Suunto PM 5/SPC Inclinometer + 200' steel chain

Accuracy ½ - 1 unit per 100

Parameters measured % grade, secant of slope

Additional information (for understanding results) Results used in topographic contour plan and in conducting MaxMin E.M. survey.

AIRBORNE SURVEYS

Type of survey(s) ______

Instrument(s) ______

(specify for each type of survey)

Accuracy ______

(specify for each type of survey)

Aircraft used ______

Sensor altitude ______

Navigation and flight path recovery method ______

Aircraft altitude ______ Line Spacing ______

Miles flown over total area ______ Over claims only ______

GEOCHEMICAL SURVEY – PROCEDURE RECORD

Numbers of claims from which samples taken ______________________

____

____

Total Number of Samples ______________________

Type of Sample ______________________
(Nature of Material)

Average Sample Weight ______________________

Method of Collection ______________________

____

Soil Horizon Sampled ______________________

Horizon Development ______________________

Sample Depth ______________________

Terrain ______________________

____

Drainage Development ______________________

Estimated Range of Overburden Thickness ______________________

____

____

SAMPLE PREPARATION

(Includes drying, screening, crushing, ashing)

Mesh size of fraction used for analysis ______________________

____

____

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General ______________________

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ANALYTICAL METHODS

Values expressed in: per cent ☐ p. p. m. ☐ p. p. b. ☐

Cu, Pb, Zn, Ni, Co, Ag, Mo, As,-(circle)

Others ______________________

Field Analysis (______________________ tests)

Extraction Method ______________________

Analytical Method ______________________

Reagents Used ______________________

Field Laboratory Analysis

No. (______________________ tests)

Extraction Method ______________________

Analytical Method ______________________

Reagents Used ______________________

Commercial Laboratory (______________________ tests)

Name of Laboratory ______________________

Extraction Method ______________________

Analytical Method ______________________

Reagents Used ______________________

General ______________________

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PREFIX	NUMBER
P	479026
P	479027
P	479028
P	479029
P	479030
P	479031
P	479032
P	479033
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P	479043
P	479044
P	479045
P	479046
P	479047
P	479048
P	479049
P	479050
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P	479155
P	479156
P	479157
P	479158

PREFIX	NUMBER
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P	504271
P	504272
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P	504274
P	504275
P	504276
P	504277
P	504278
P	504279
P	504280
P	504282

UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA

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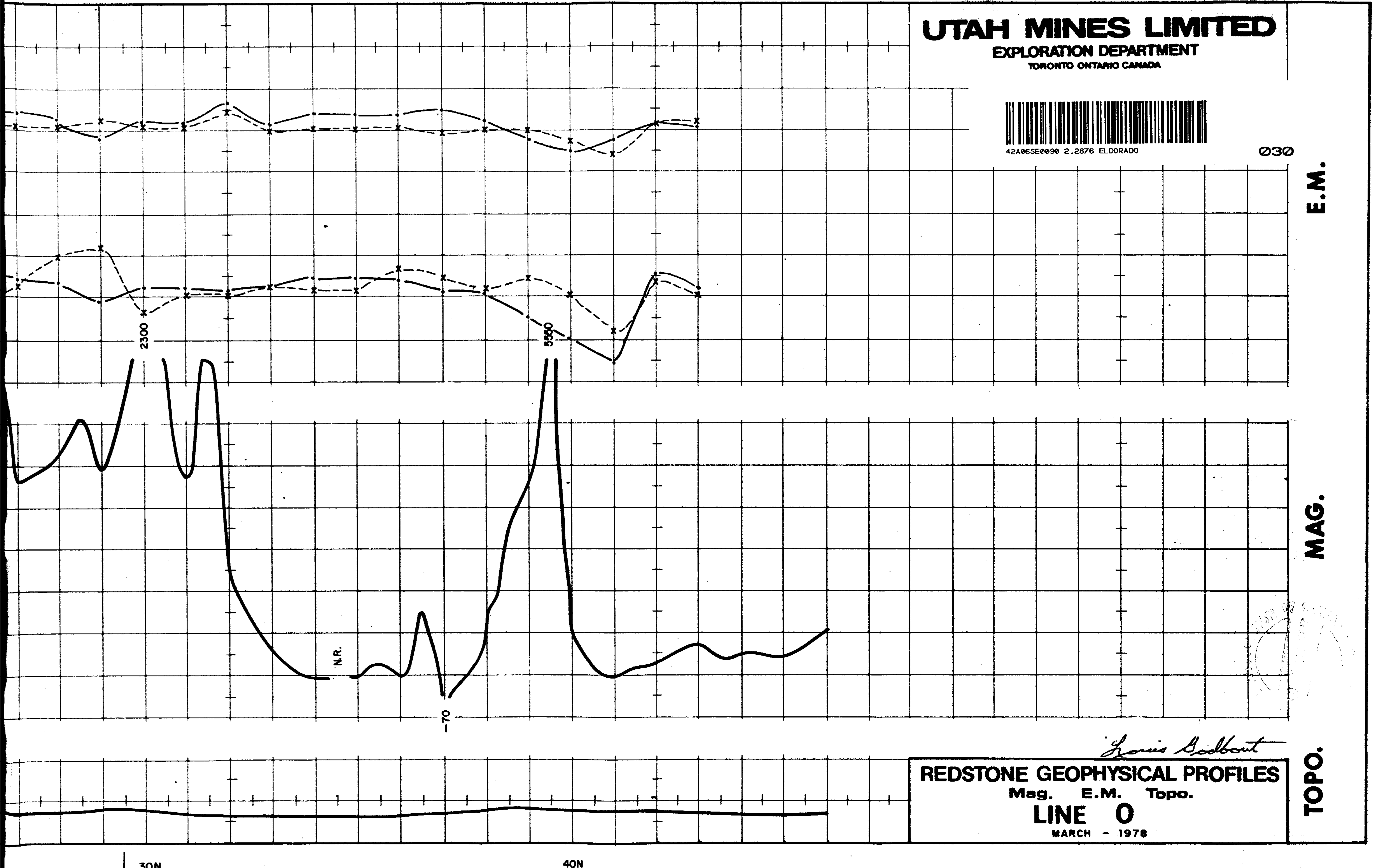


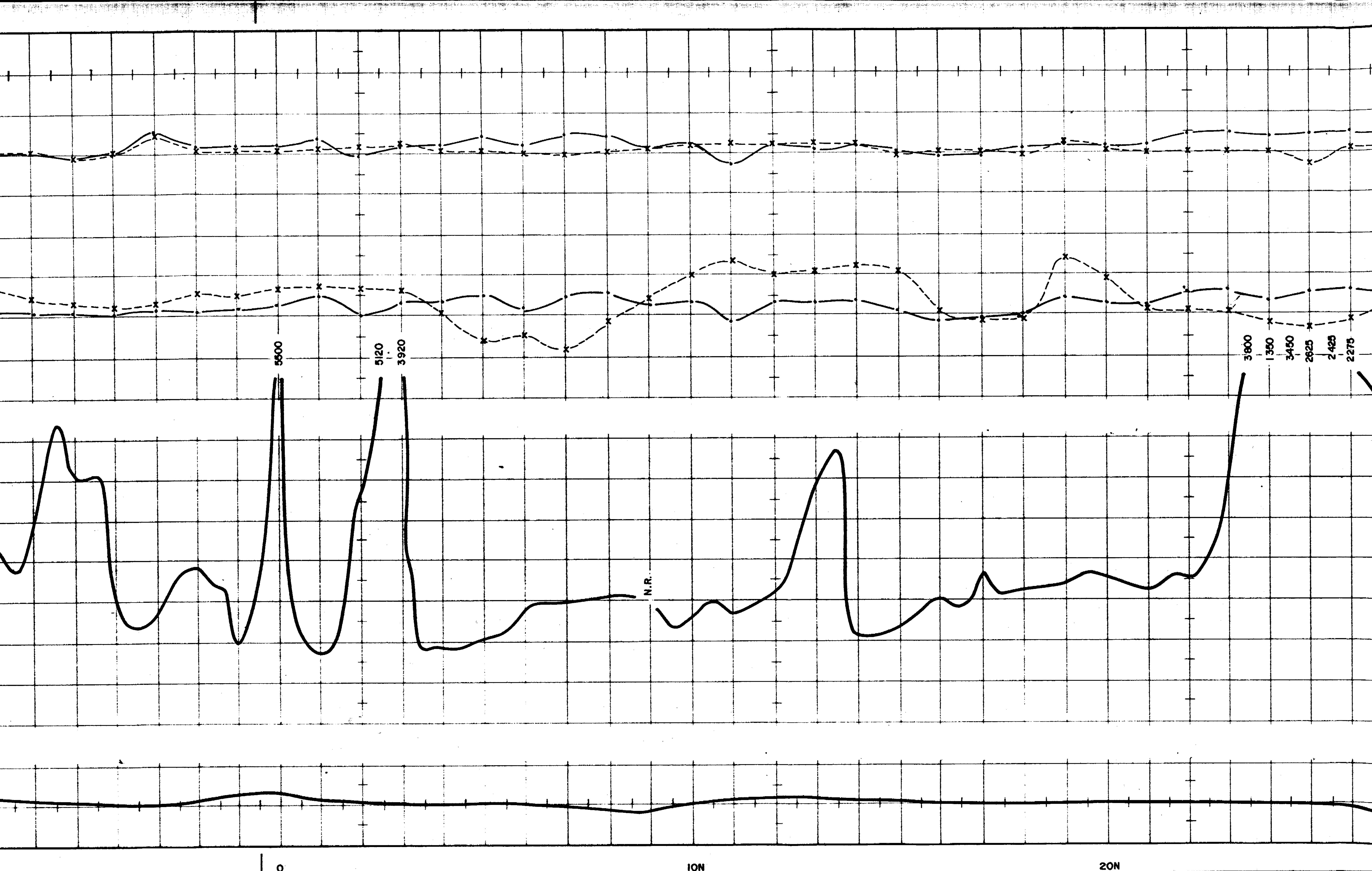
Louis Godbout

REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

LINE 0

MARCH - 1978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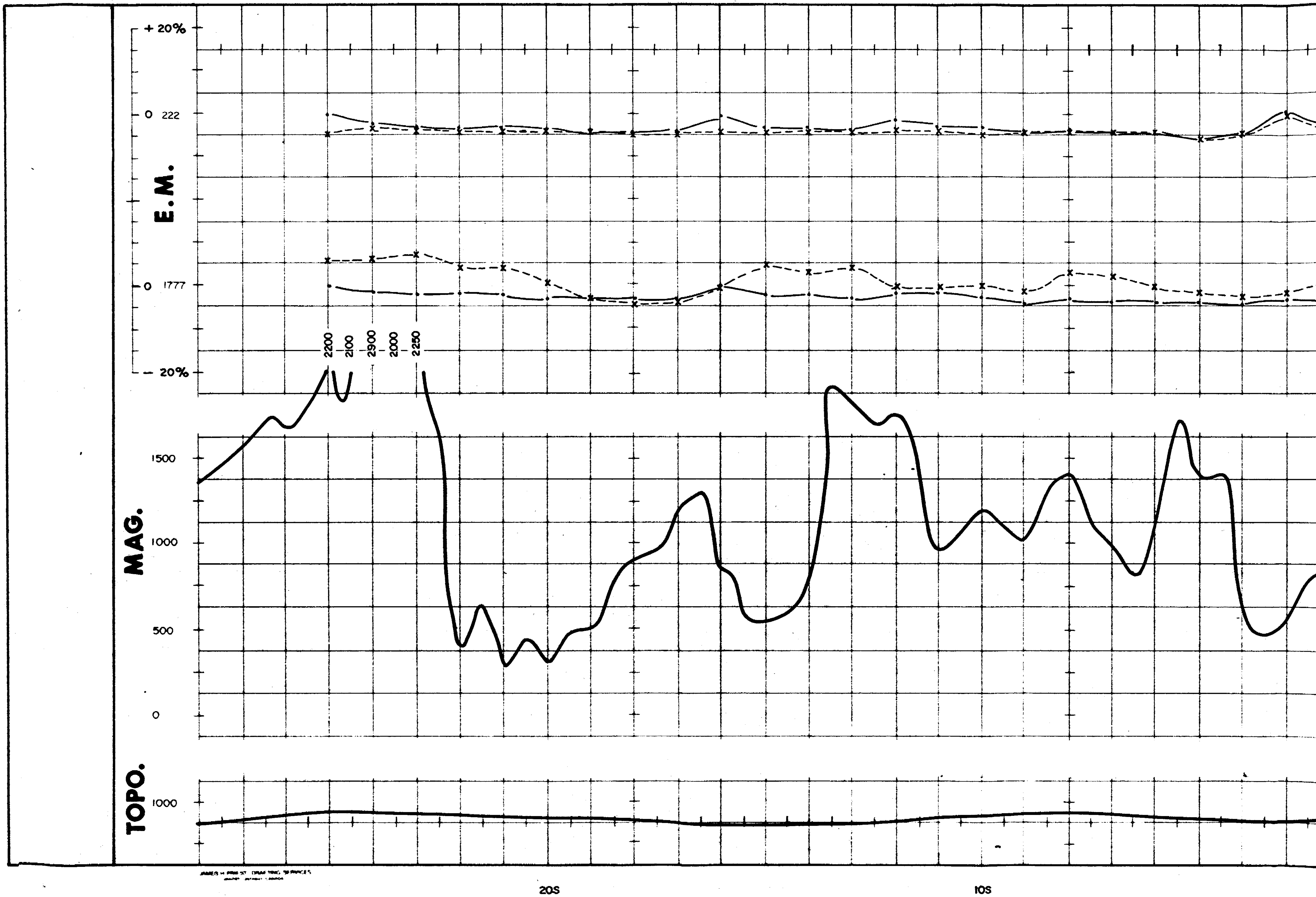
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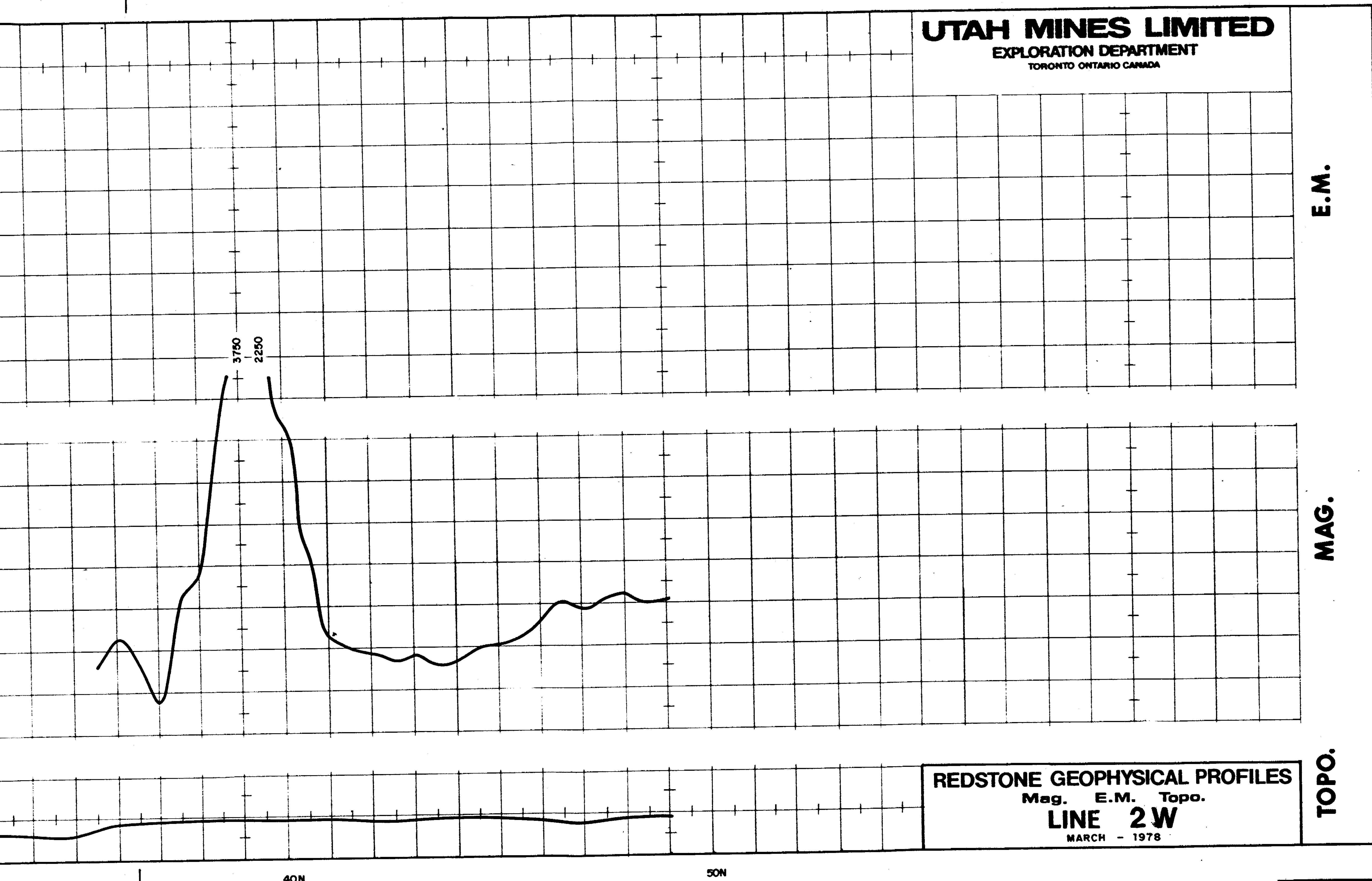
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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Mag. E.M. Topo.
LINE 2W
MARCH - 1978
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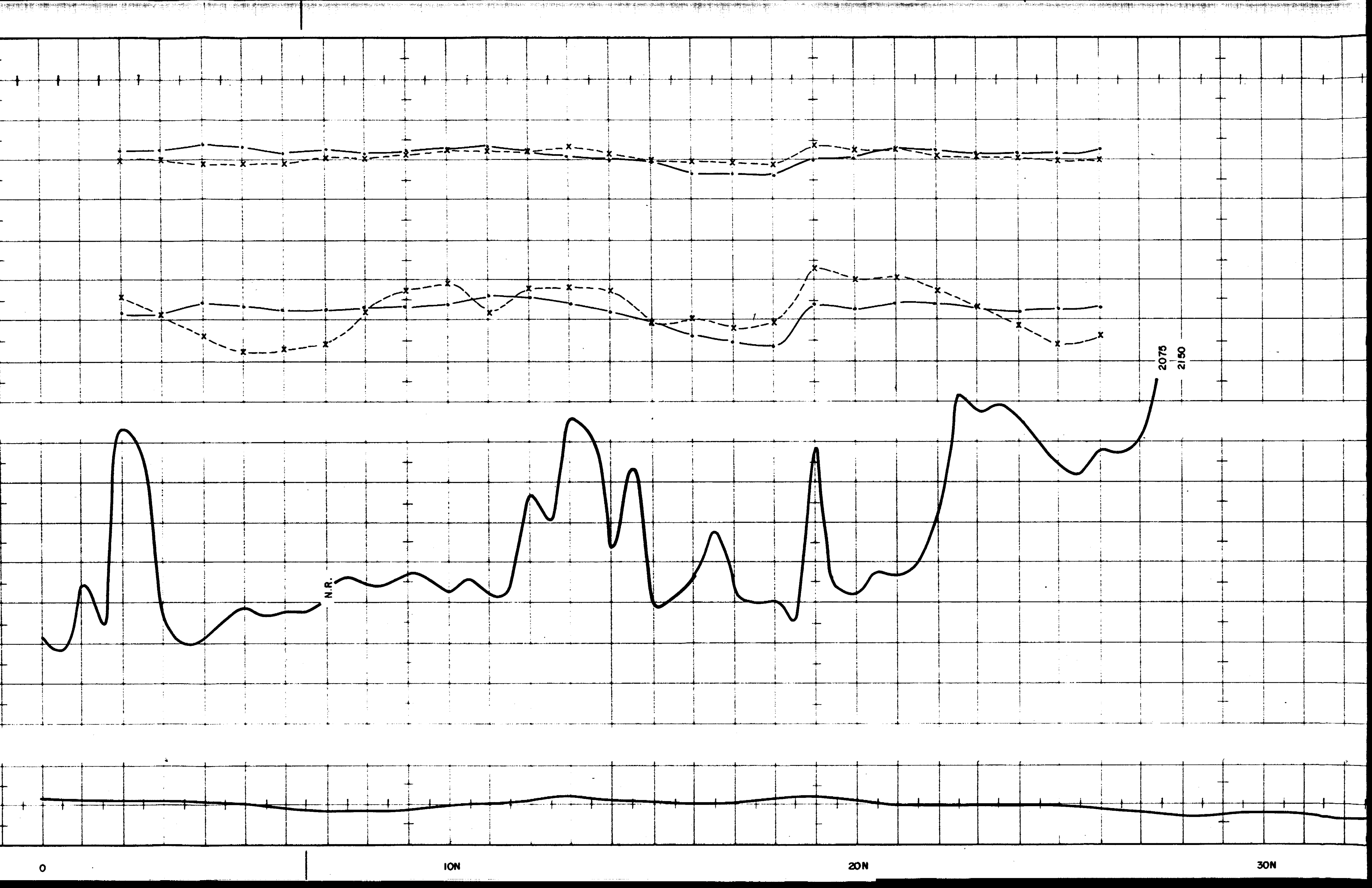

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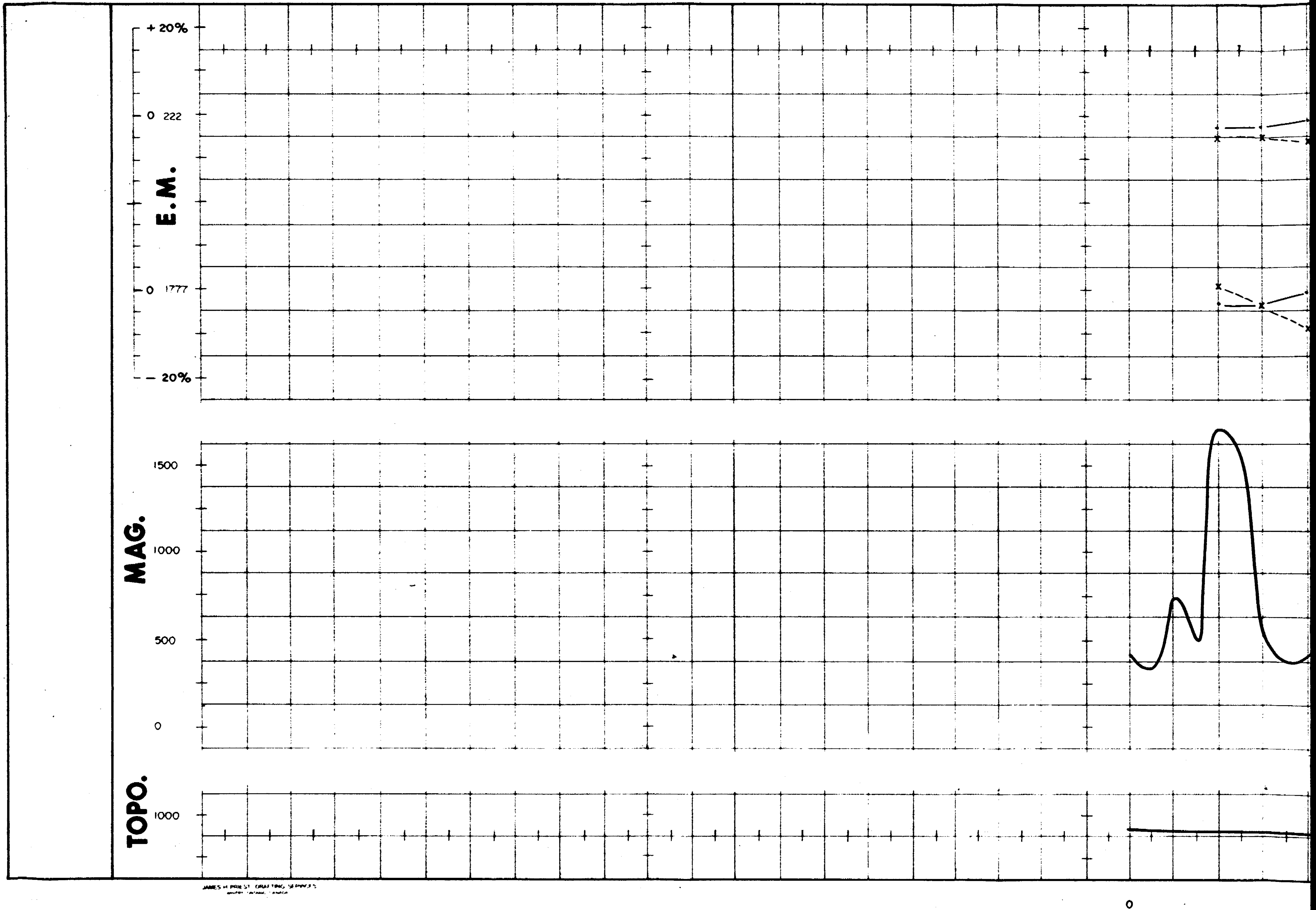
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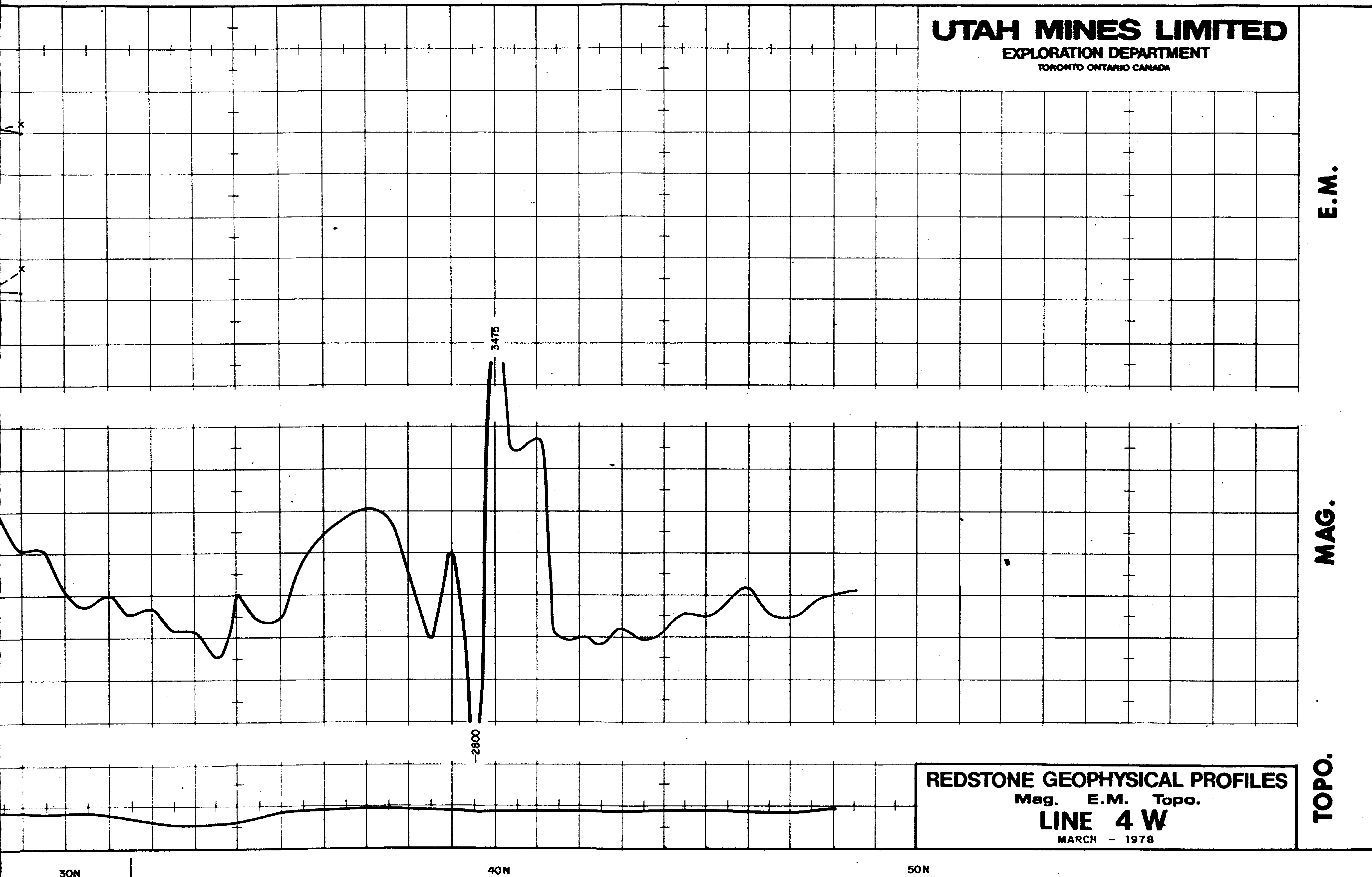
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EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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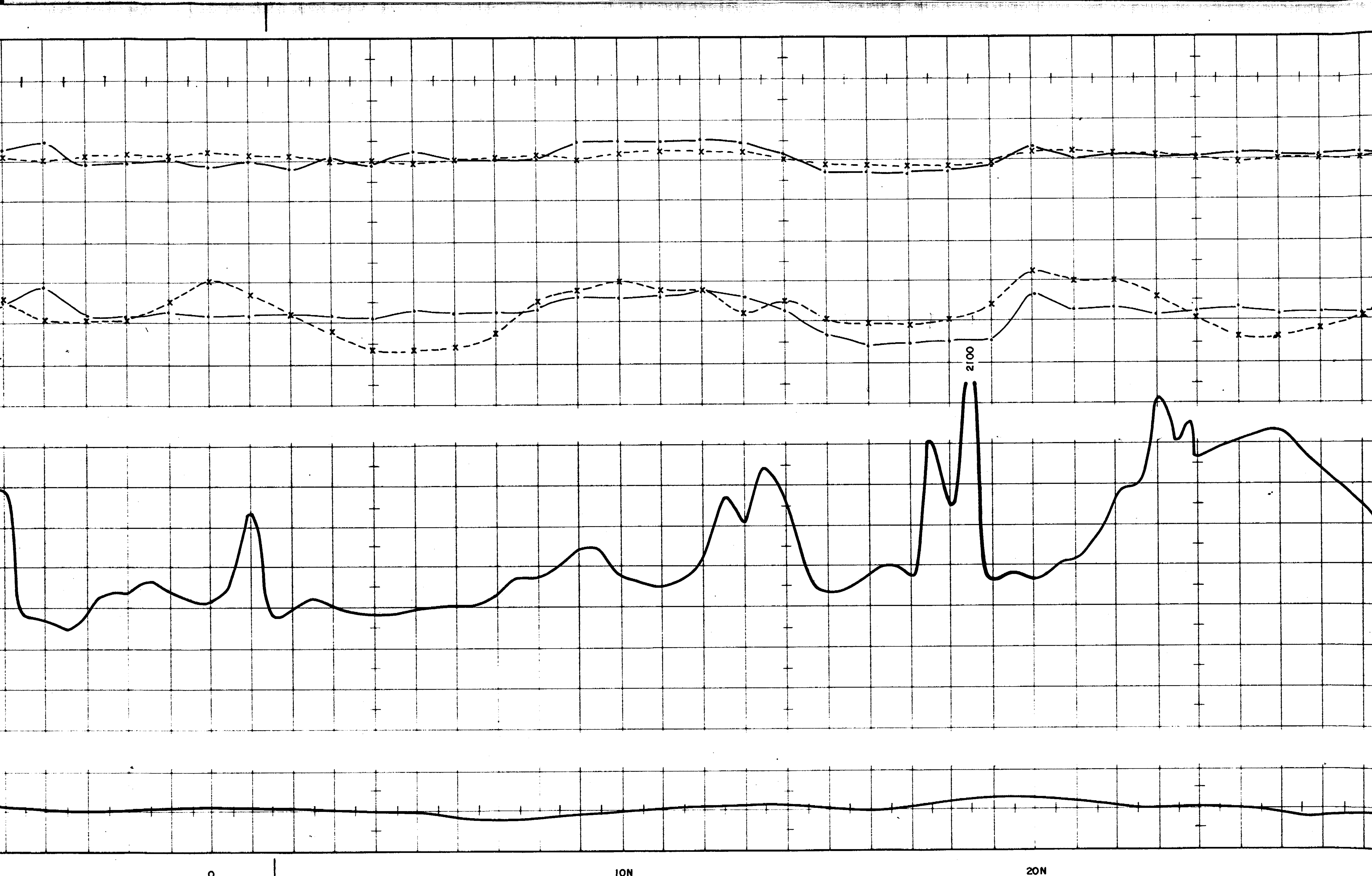

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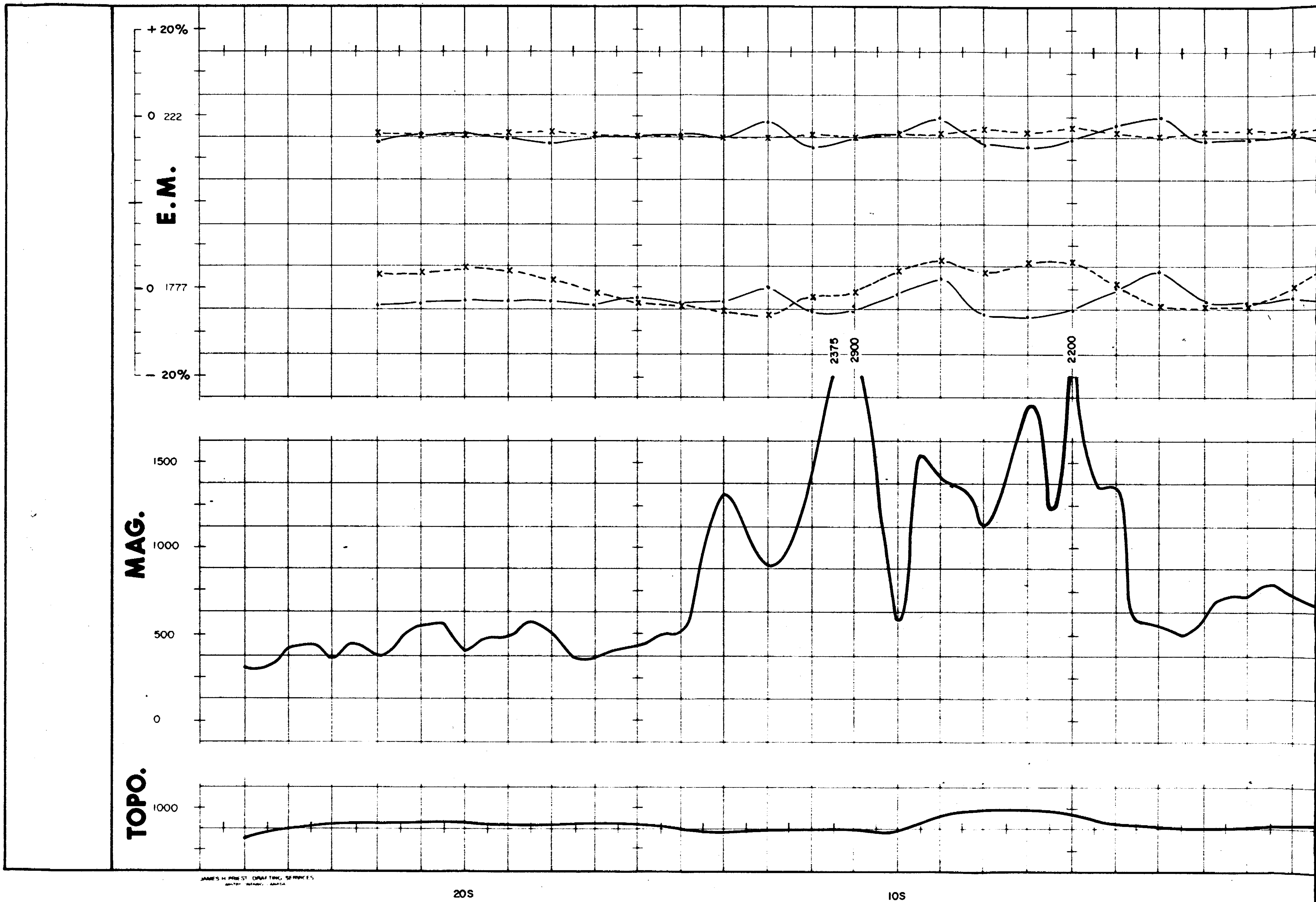
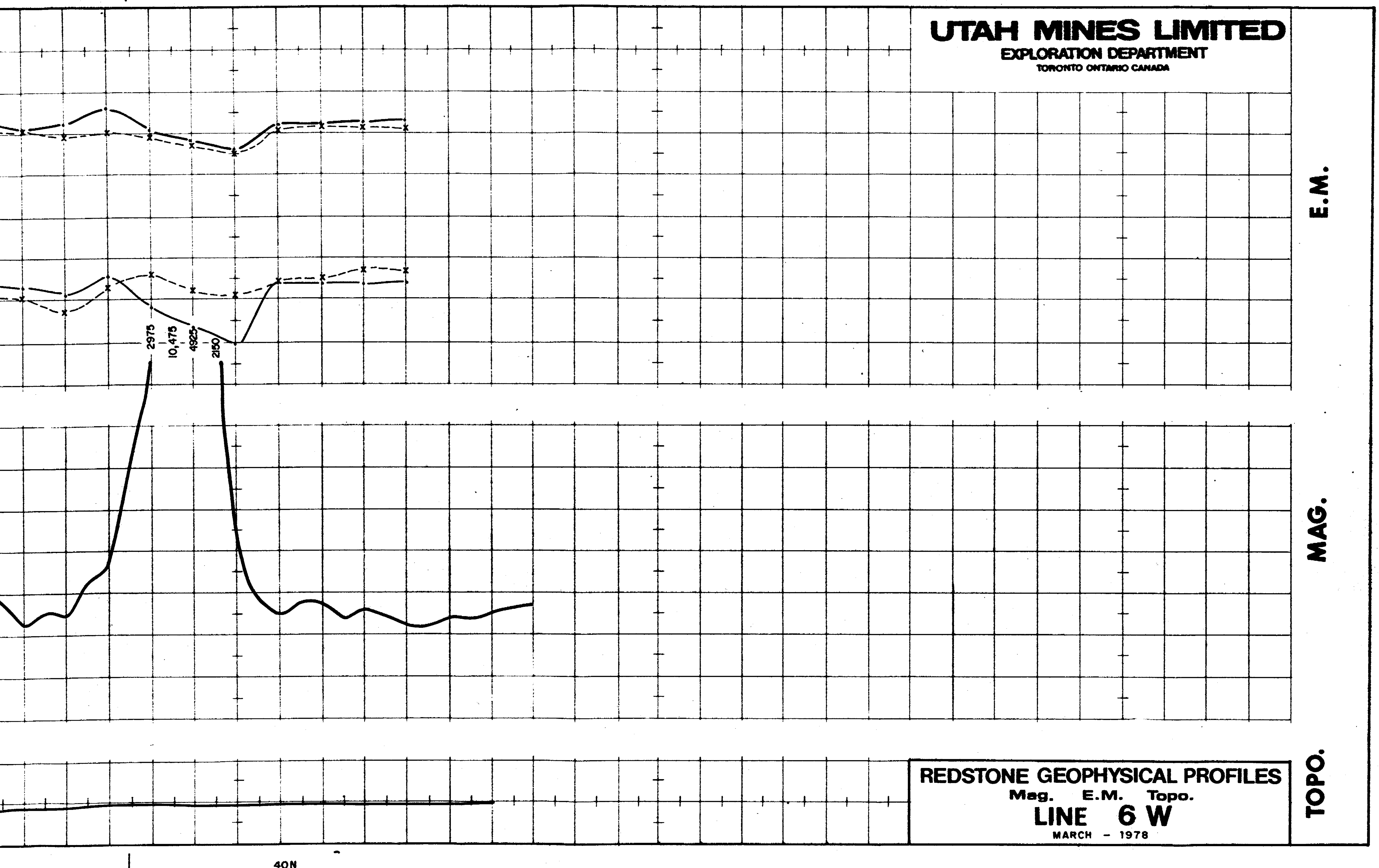


JAMES H PRIEST DRAFTING SERVICES


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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Mag. E.M. Topo.
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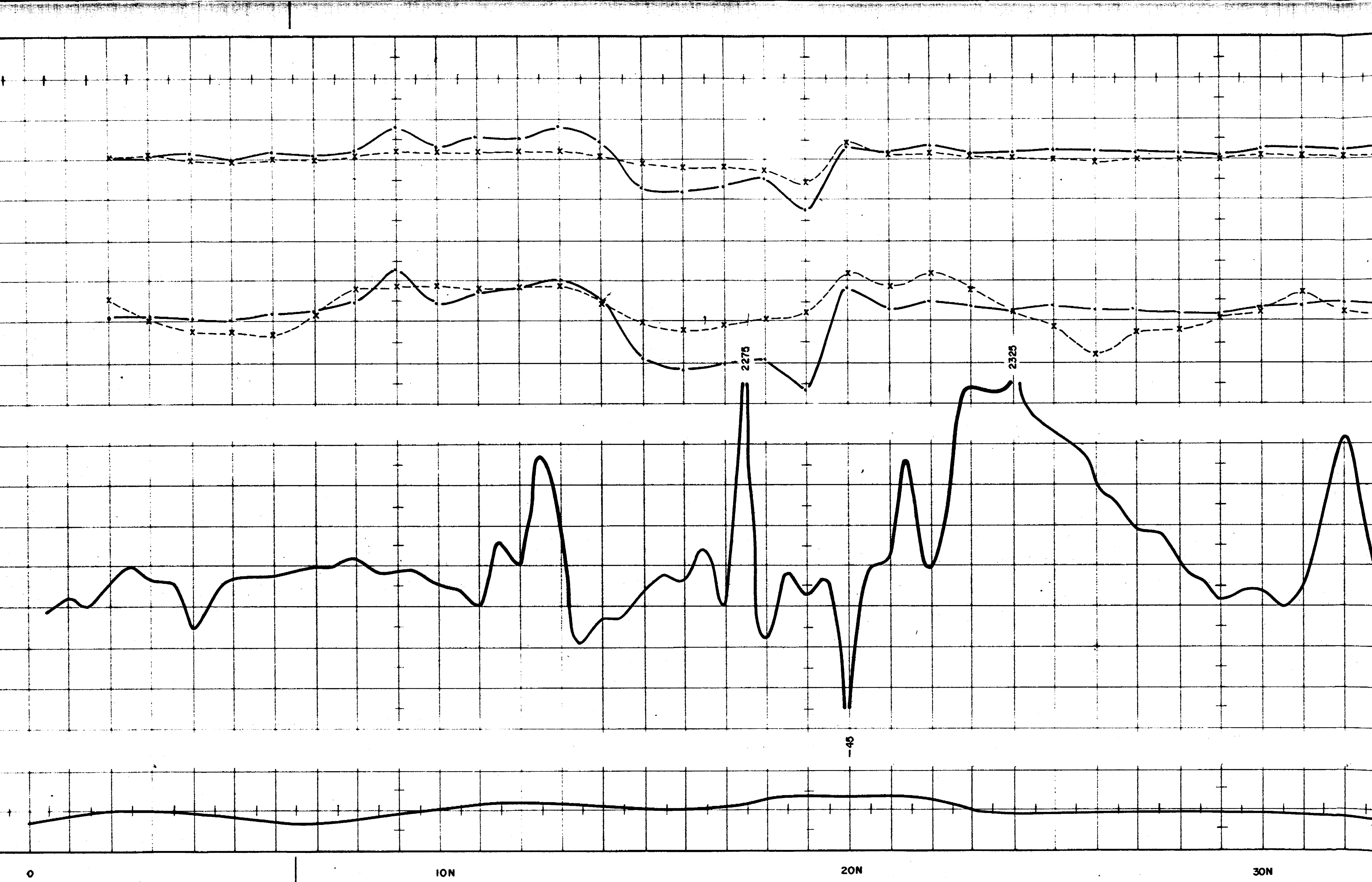
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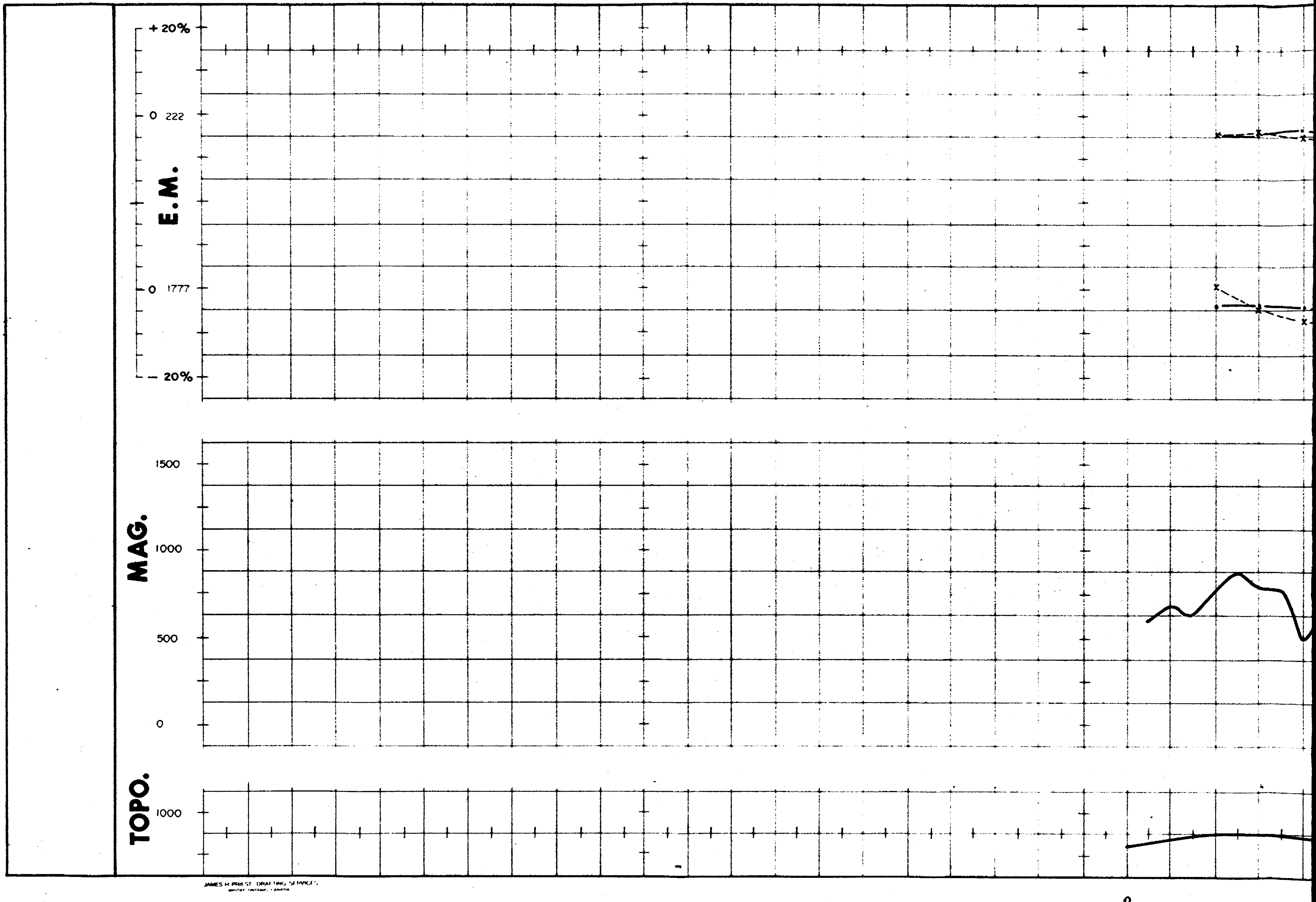
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JAMES H PRIEST DRAFTING SERVICES
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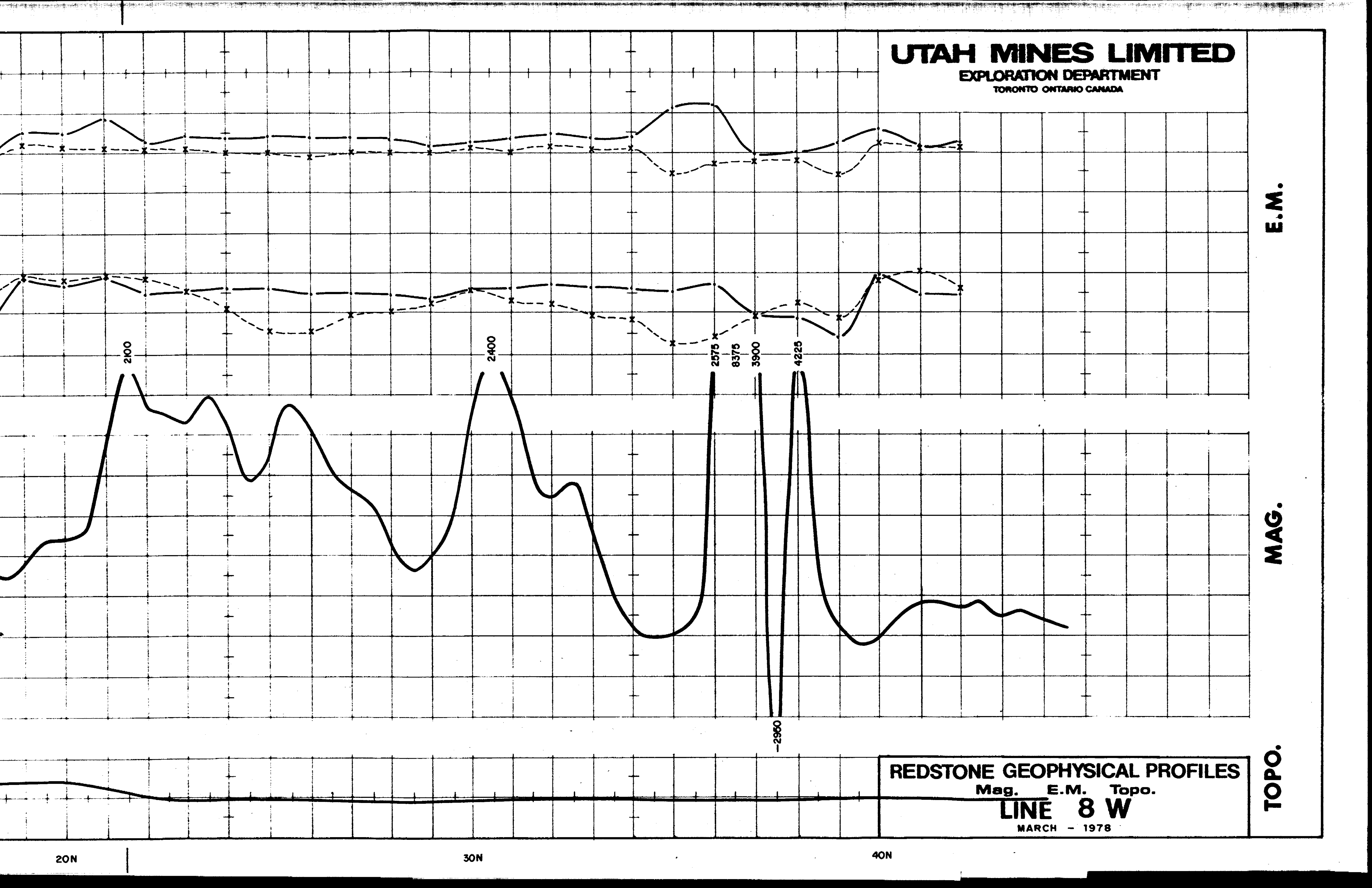

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
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REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
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MARCH - 1978

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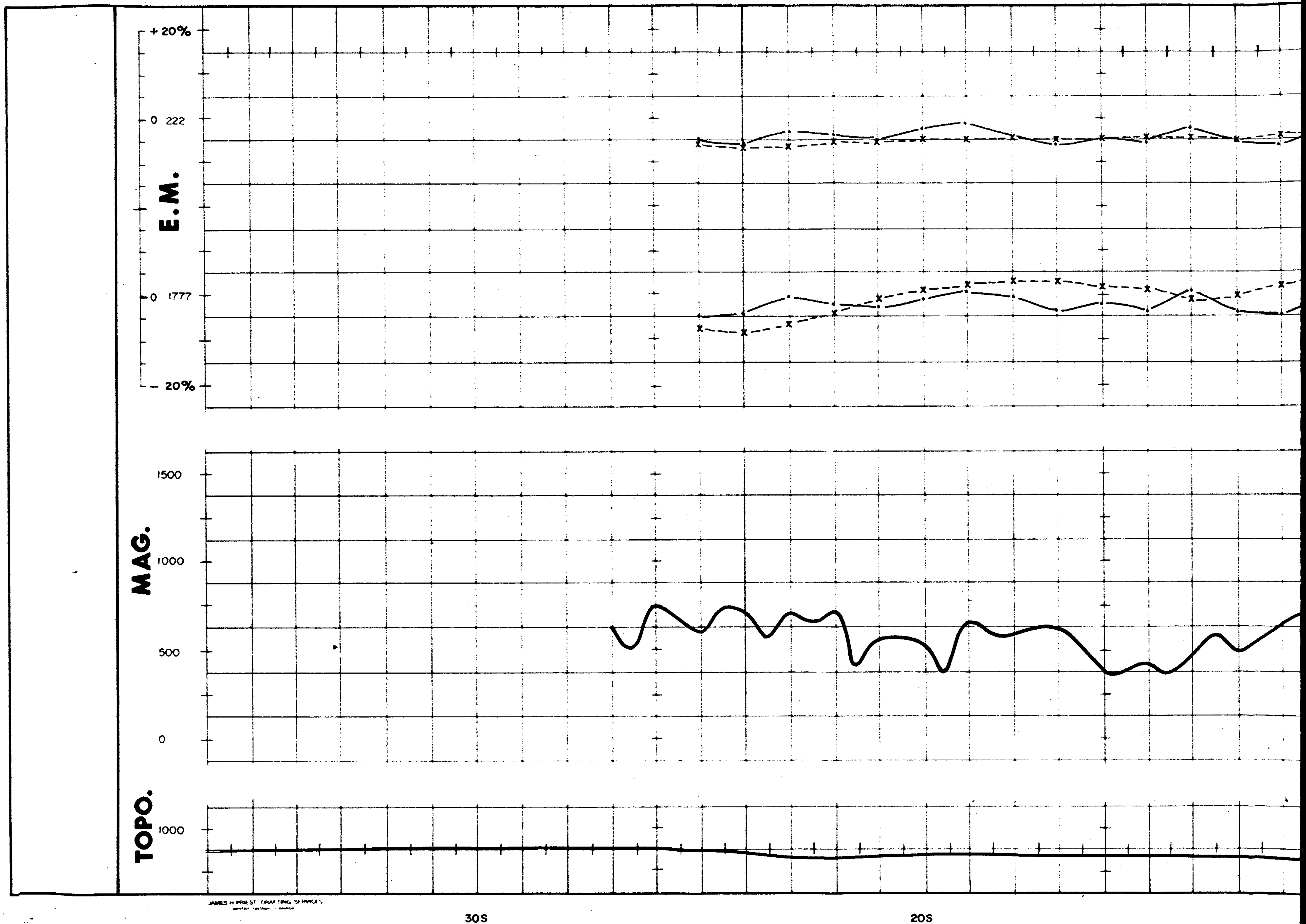

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1000
MAG.
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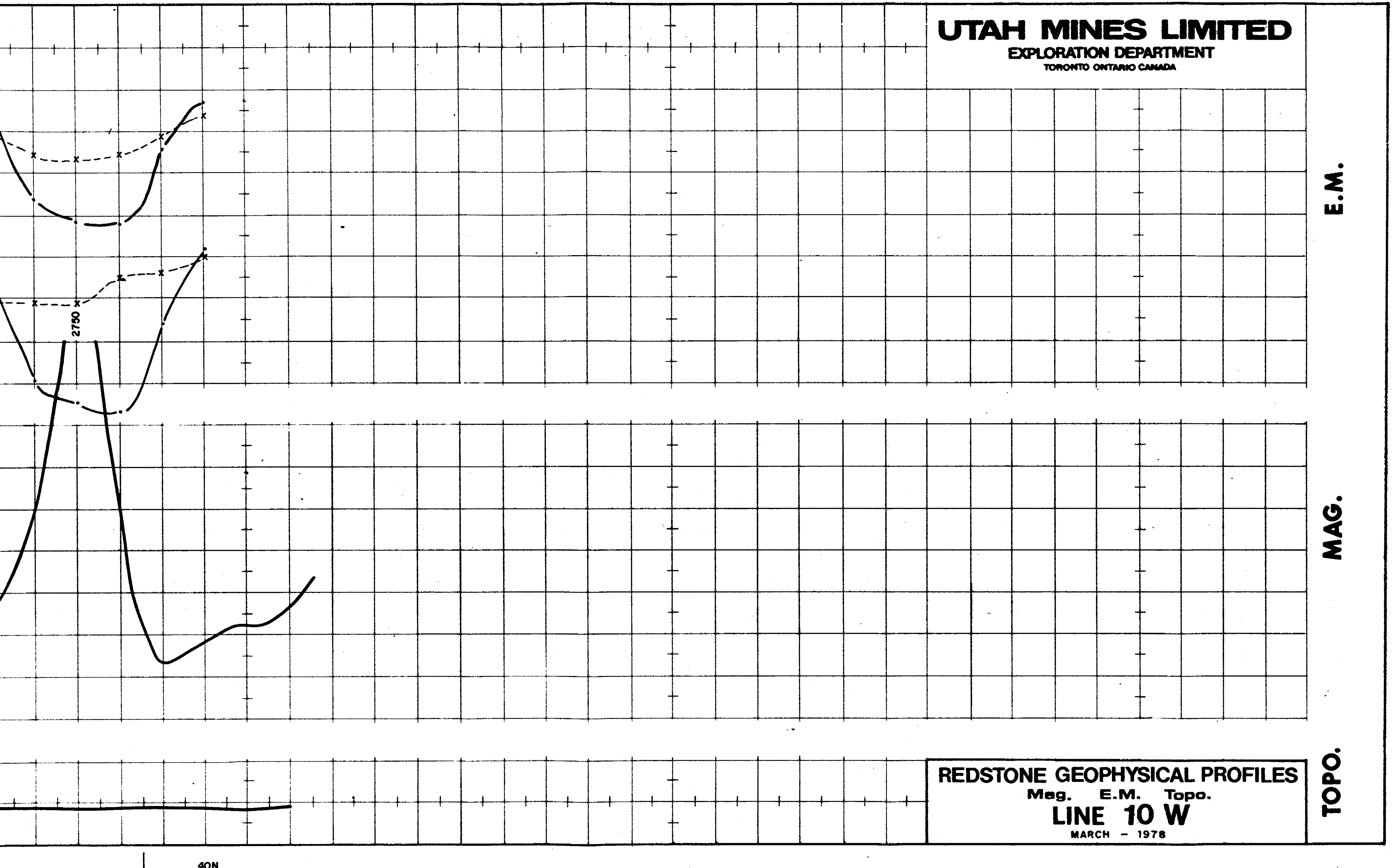
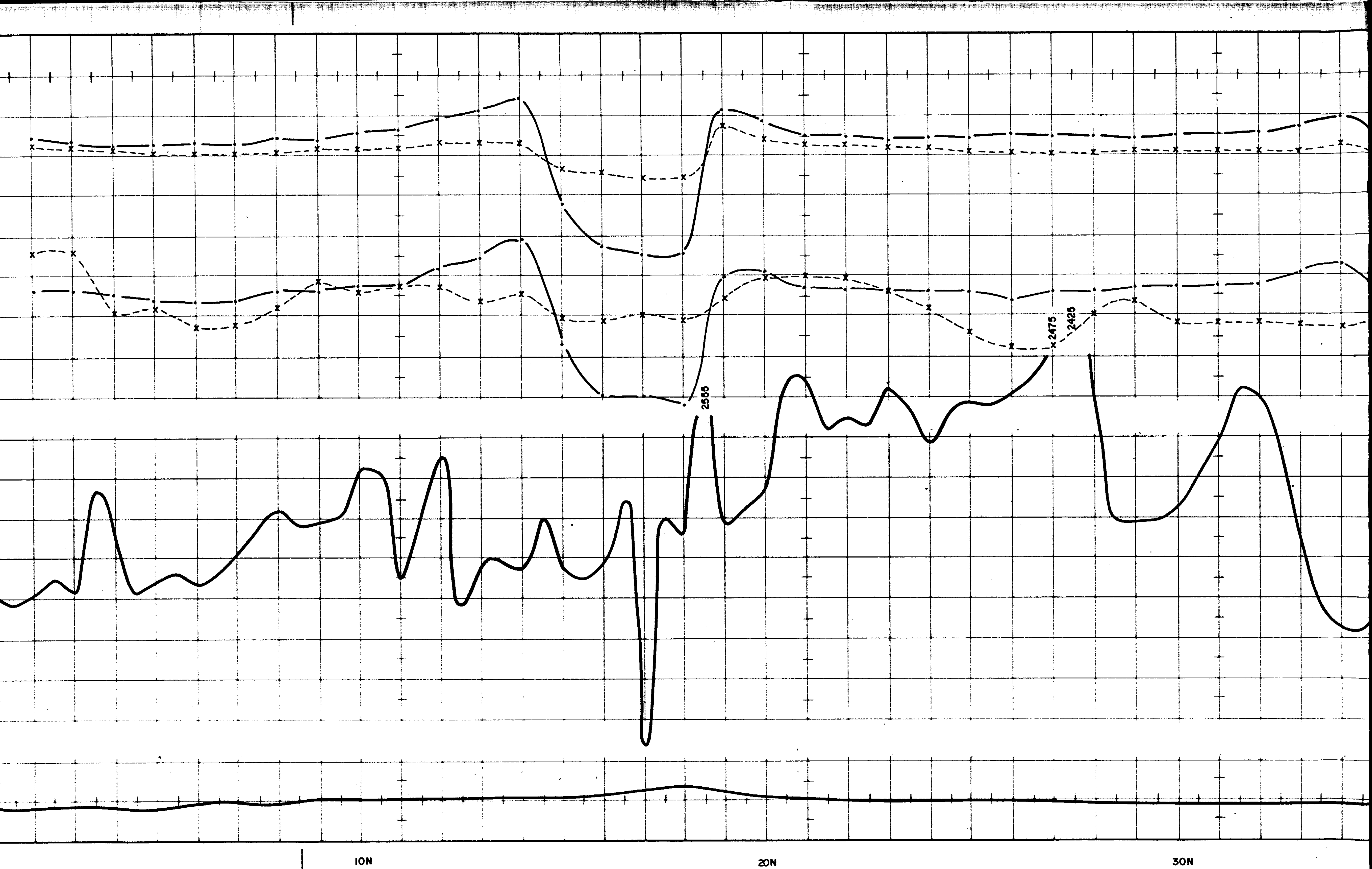
JAMES H PRIEST DRAFTING SERVICES
30S
20S

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA



REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.

LINE 10 W
MARCH - 1978



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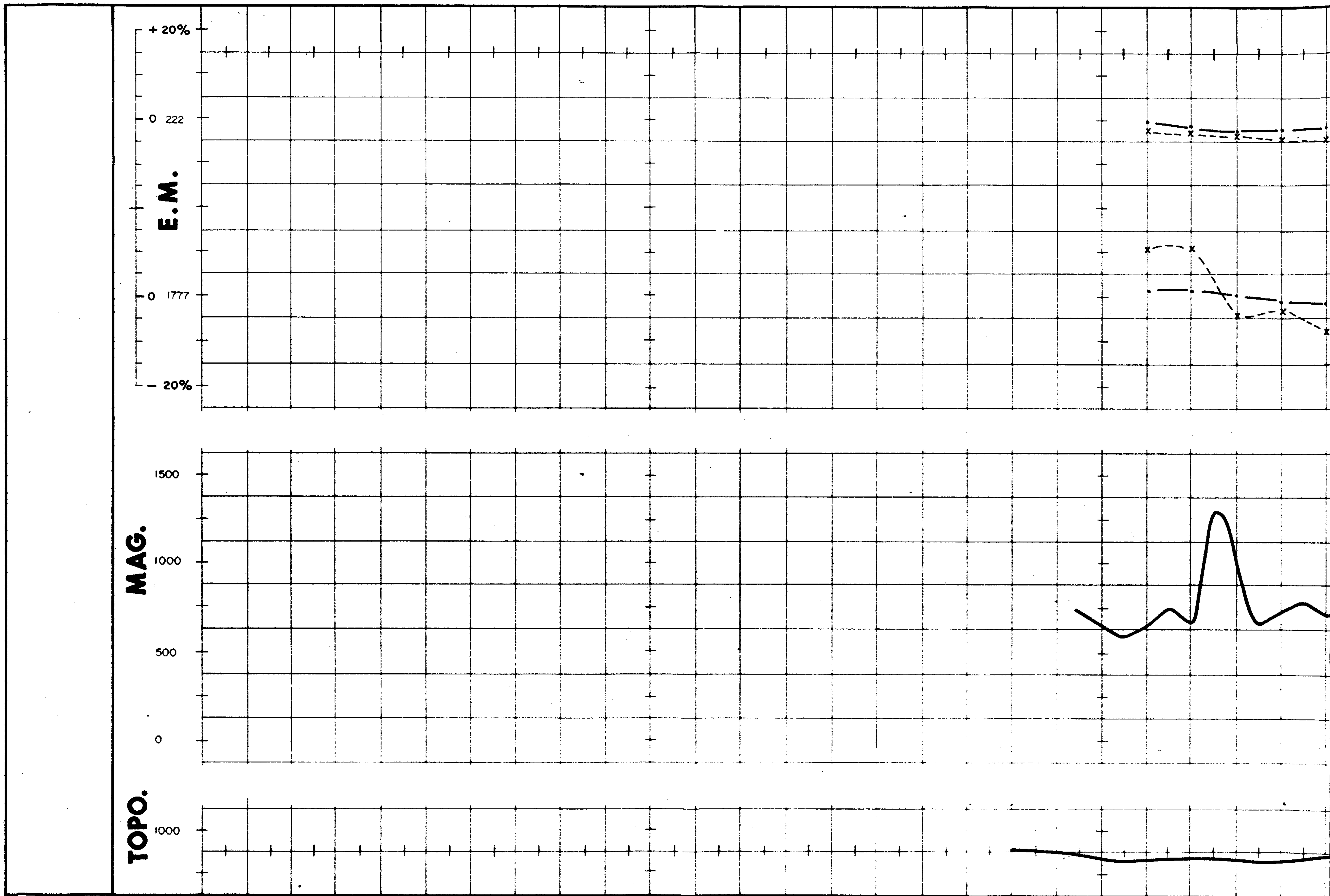

JAMES H PRIEST DRAFTING SERVICES

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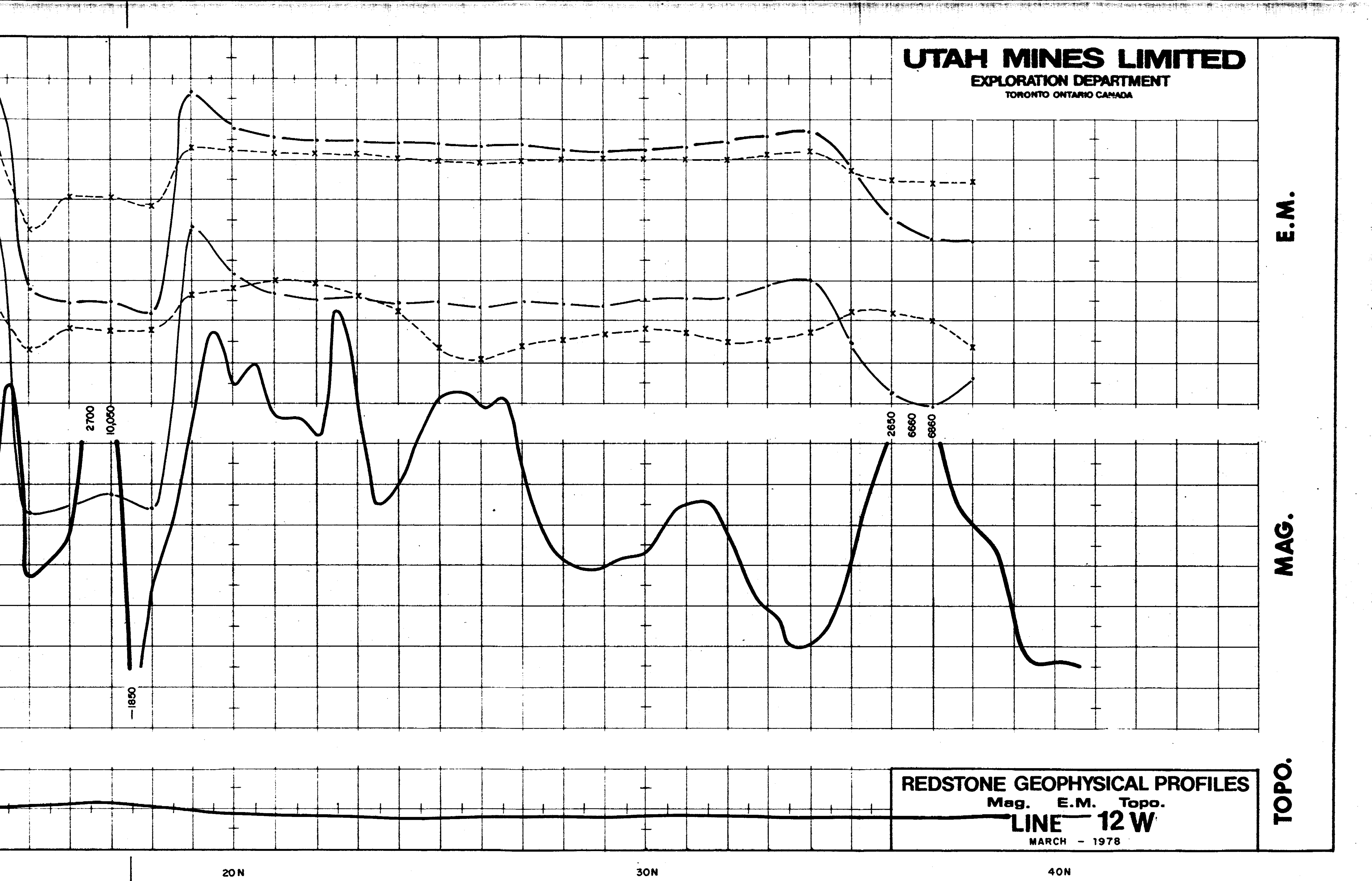

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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Mag. E.M. Topo.
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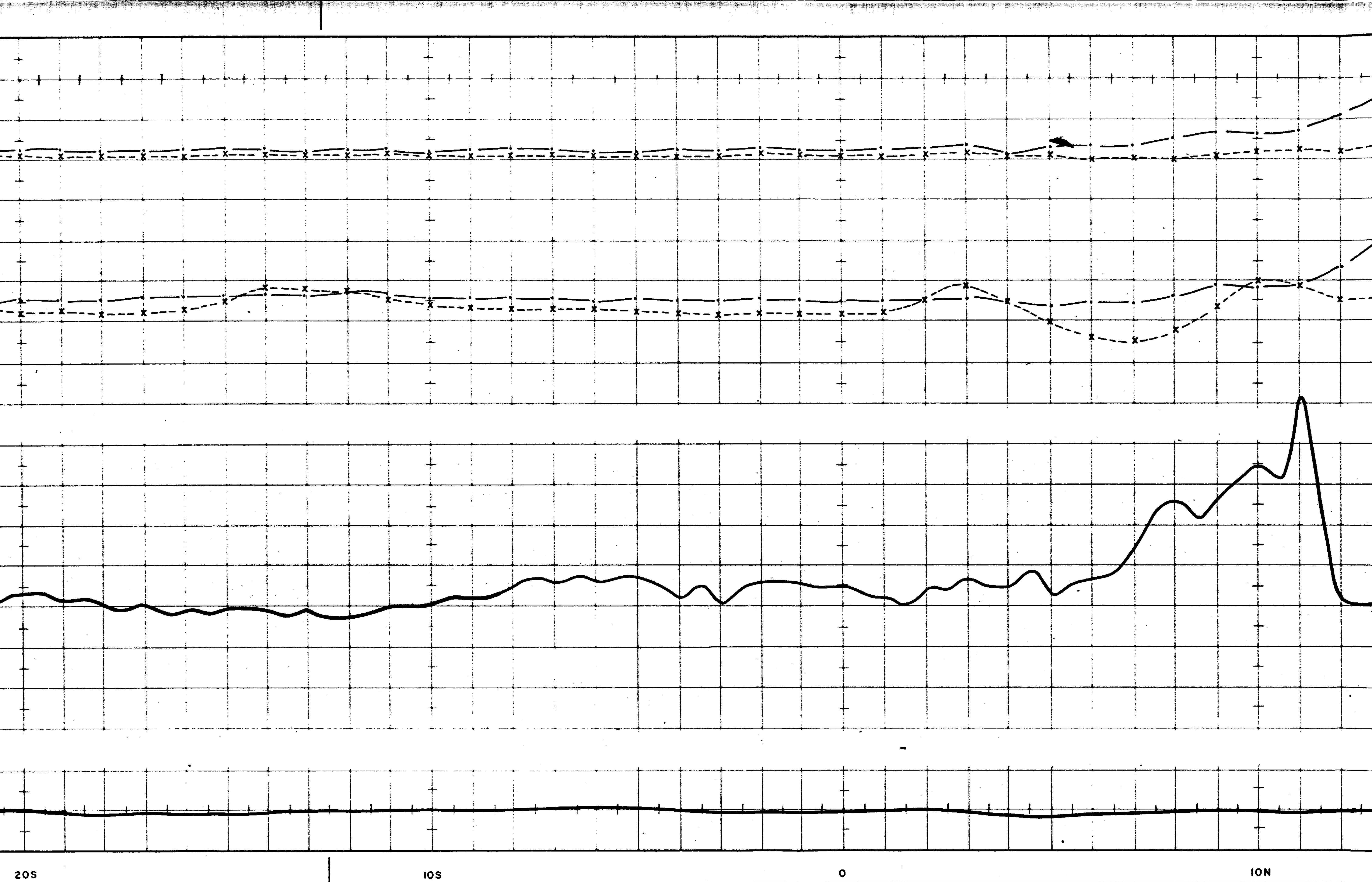
MARCH - 1978



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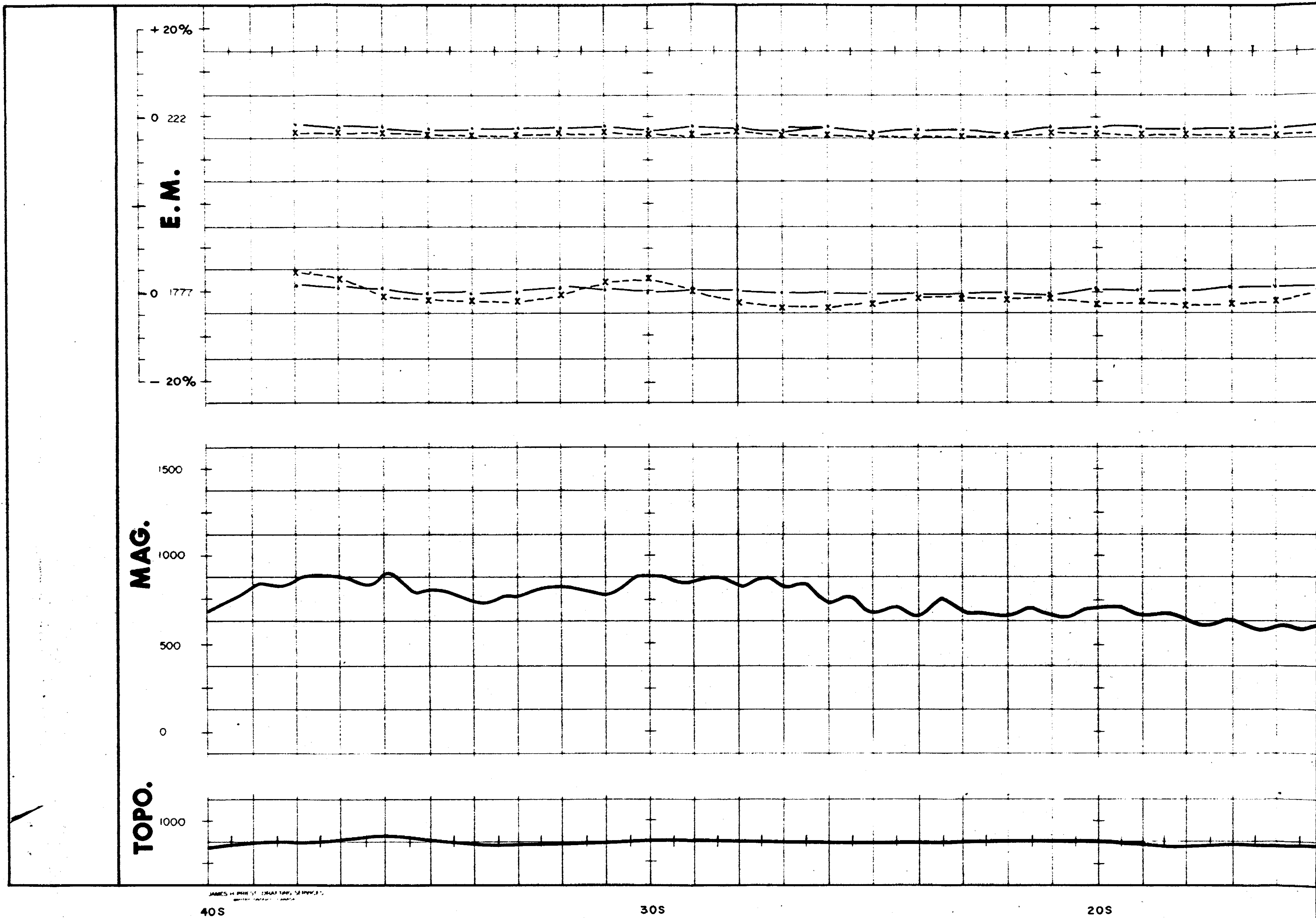
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TOPO.
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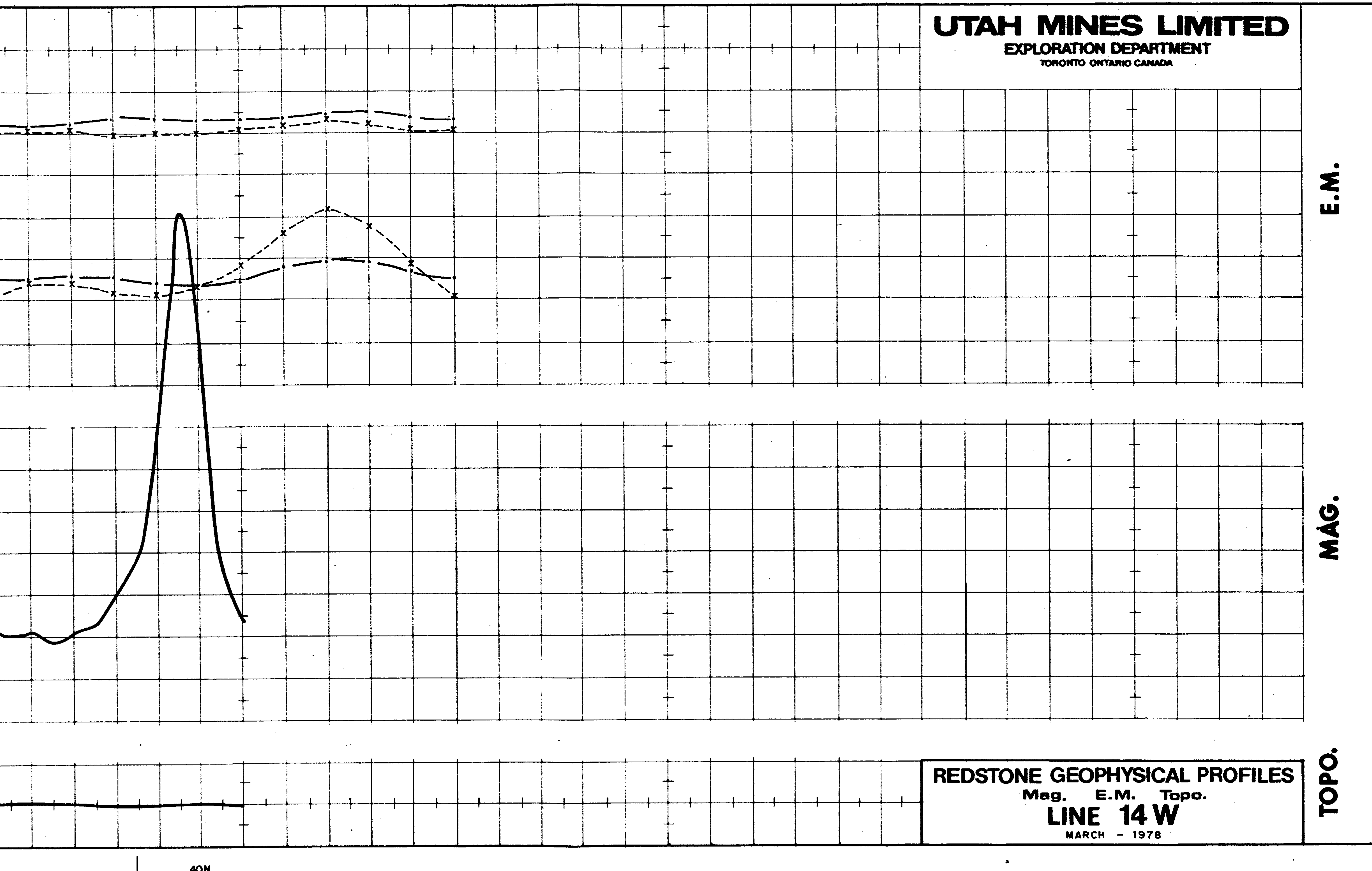
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 14 W
MARCH - 1978
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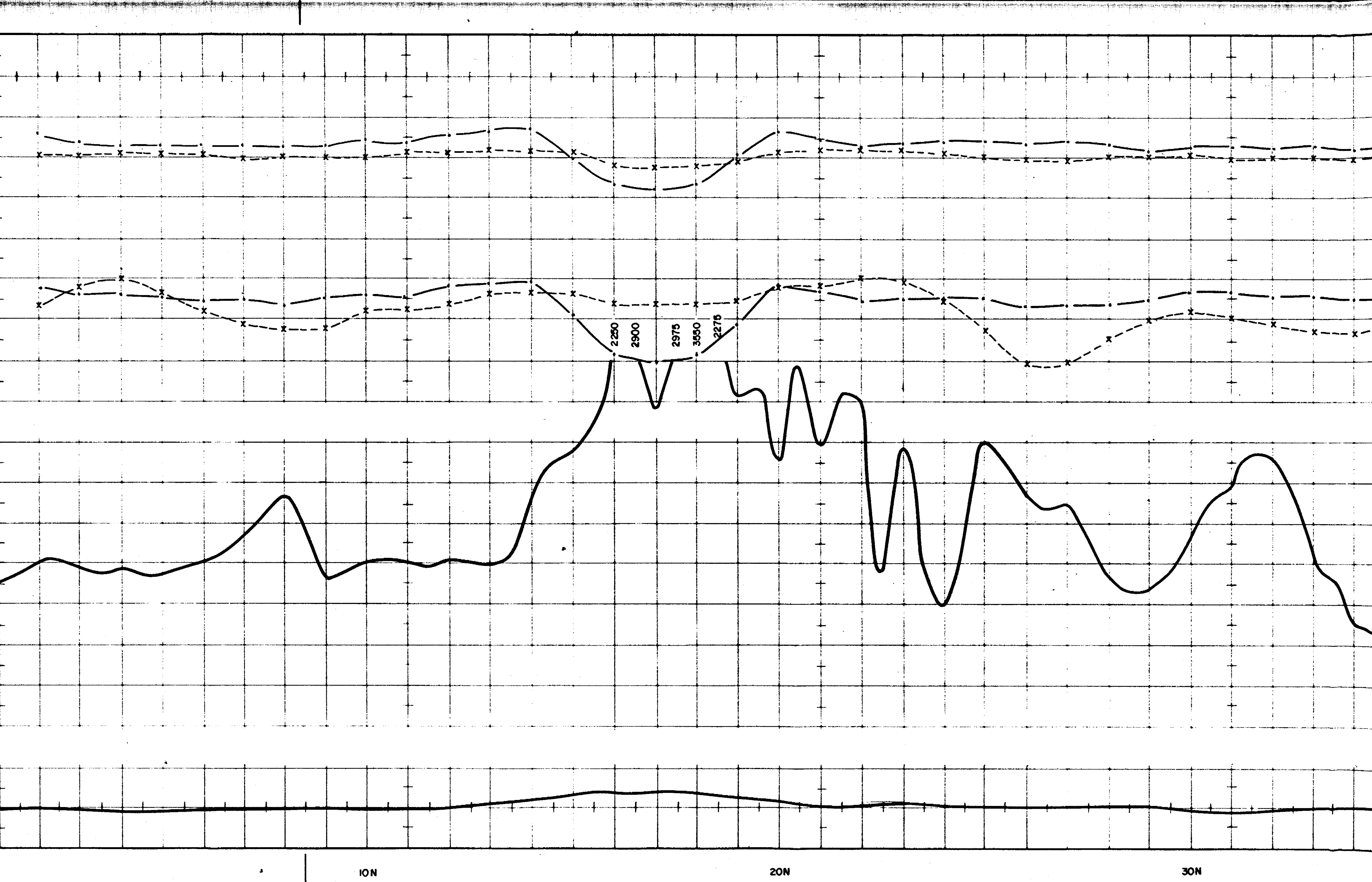
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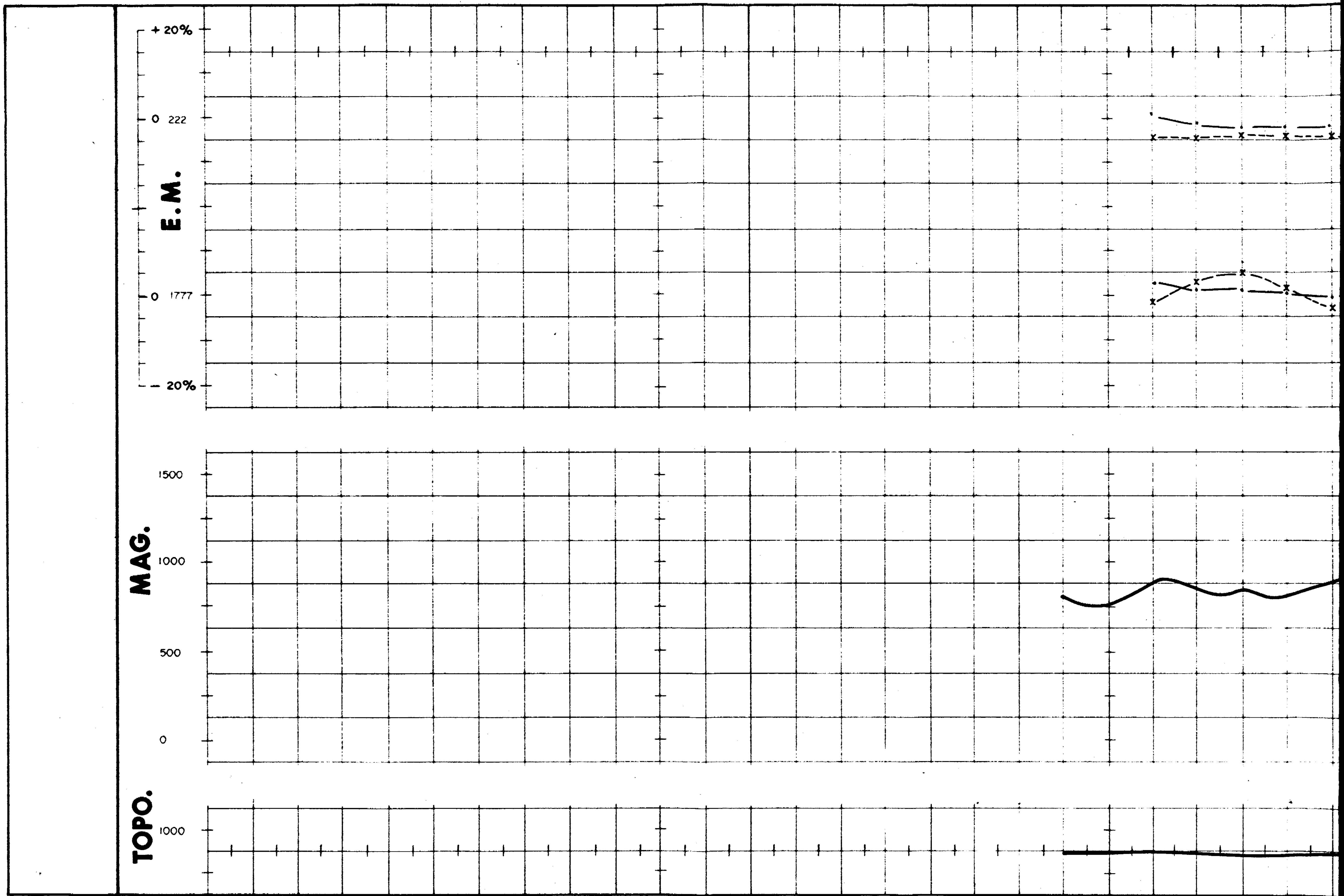

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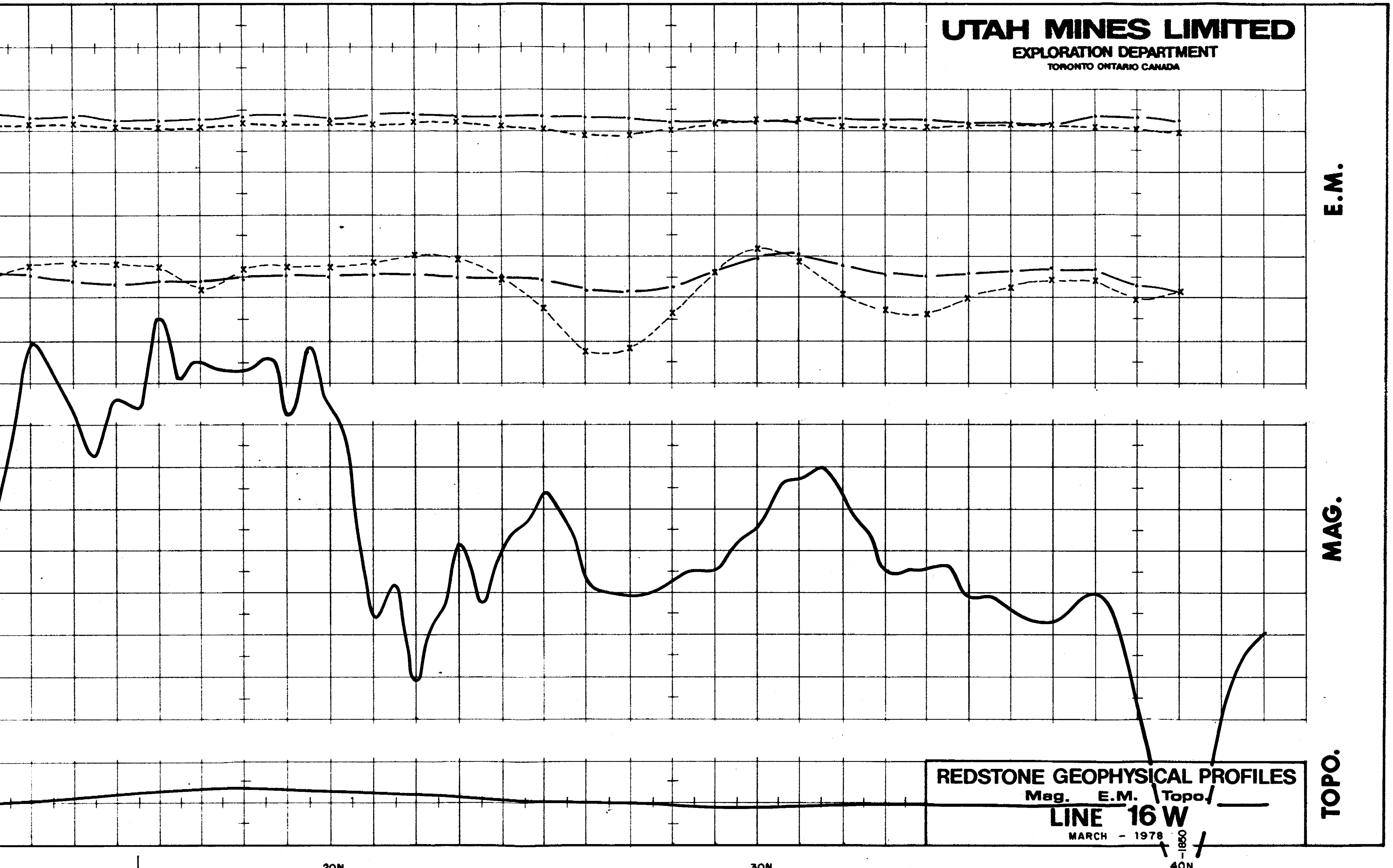
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
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TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 16 W
MARCH - 1978
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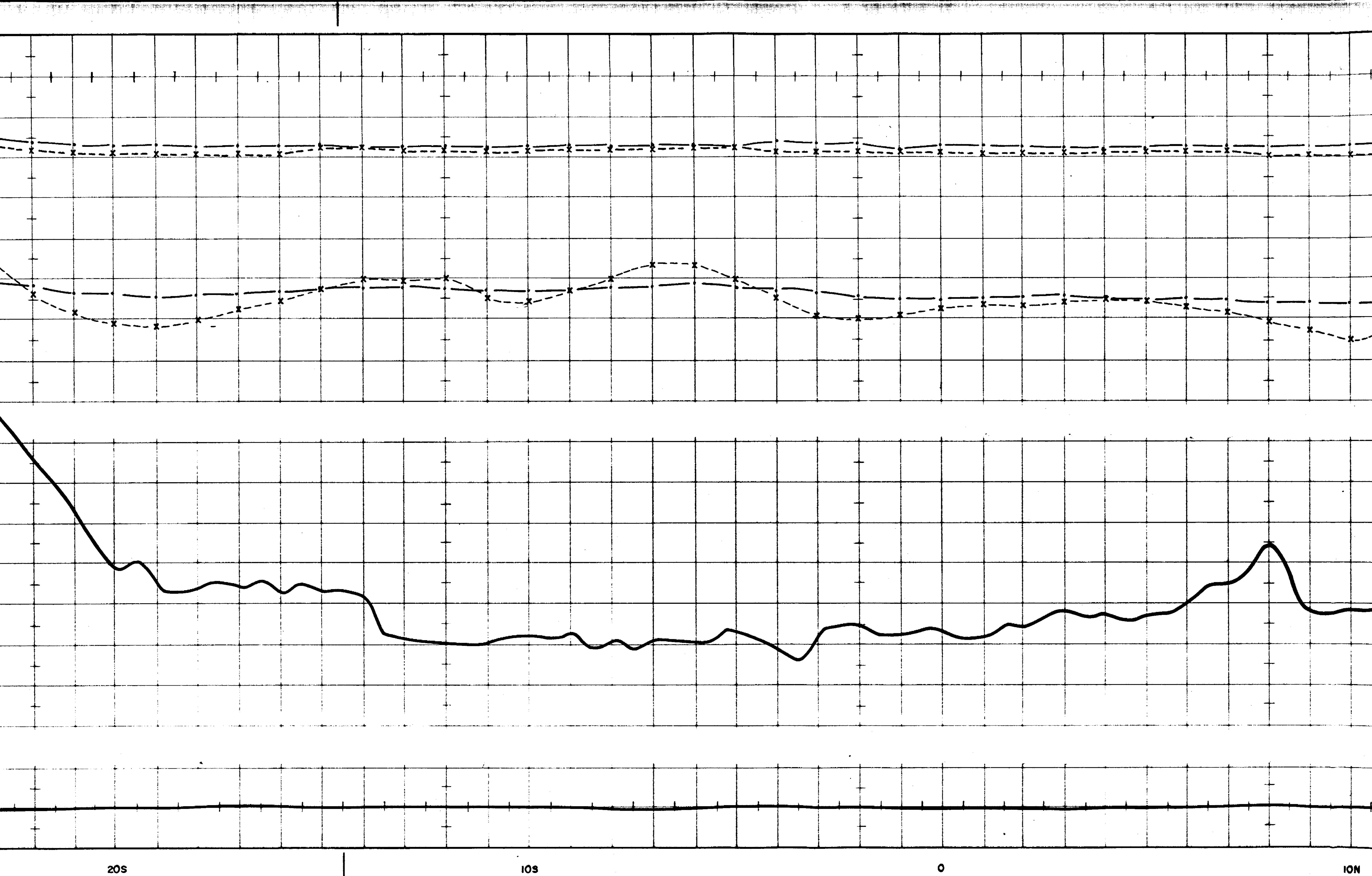
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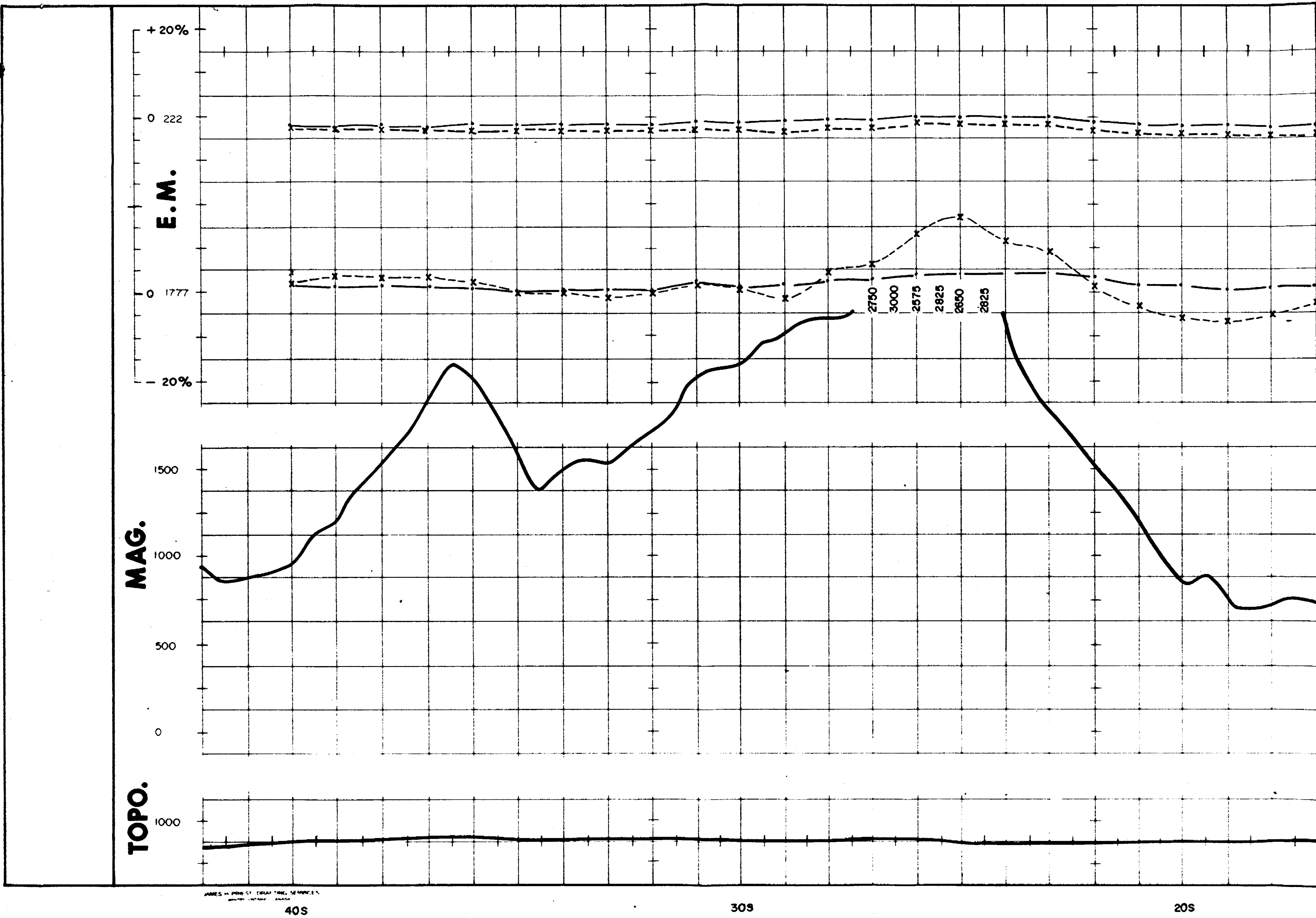

+20%
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E.M.
0 1777
2750
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2650
2825
– 20%
MAG.
1500
1000
500
0
TOPO.
1000
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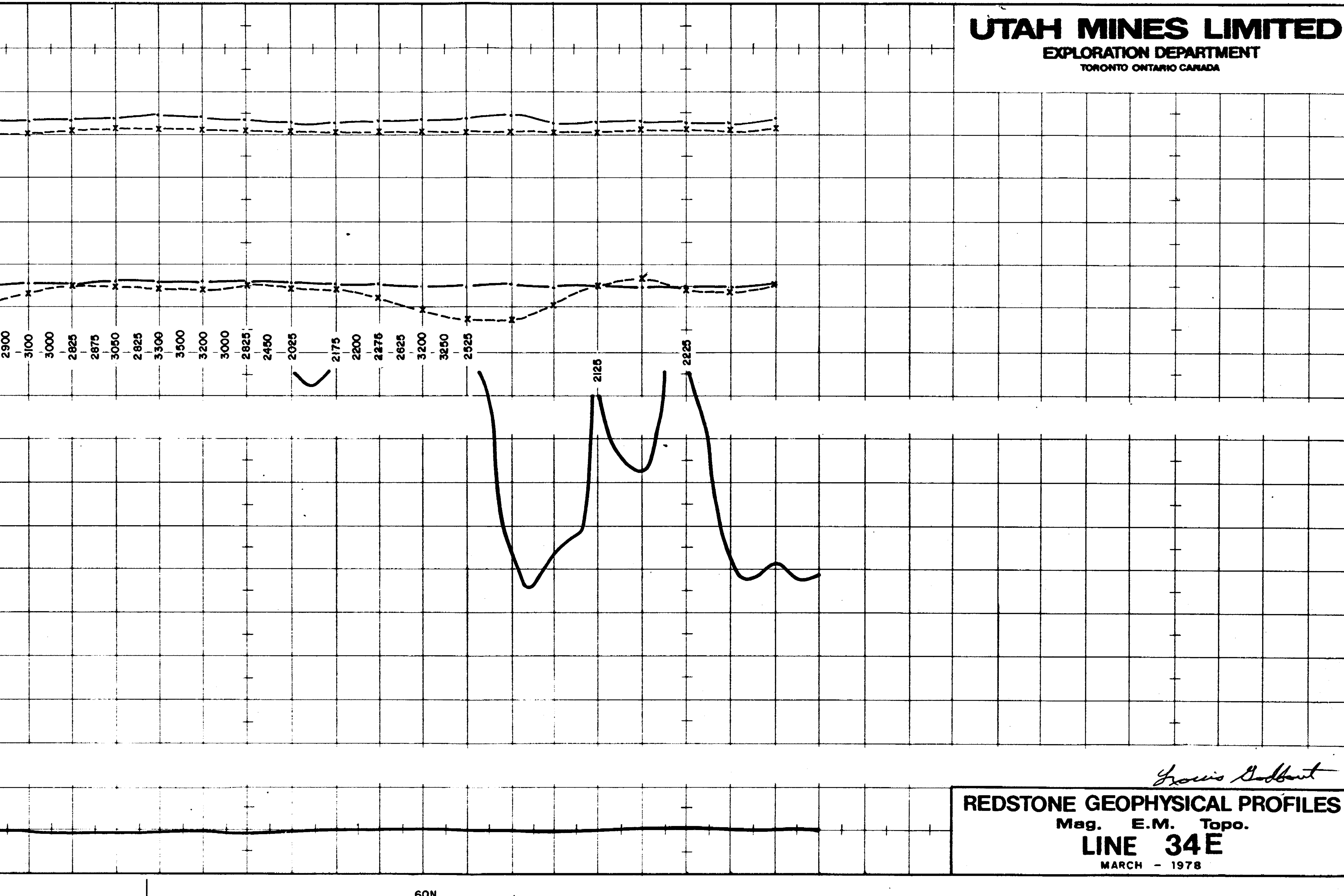
30S
20S



UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA

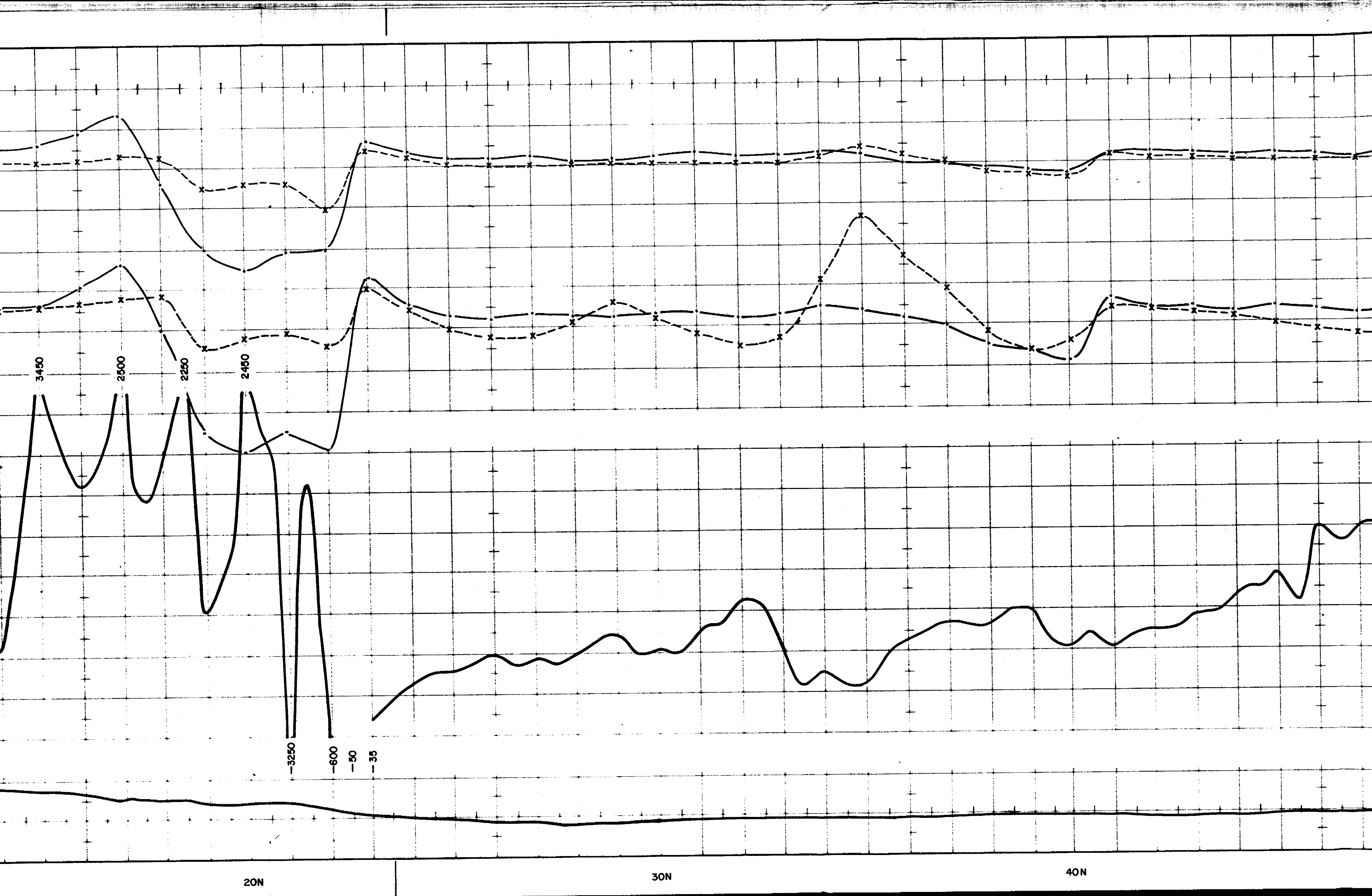
Louis Godbout

REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

LINE 34E

MARCH - 1978



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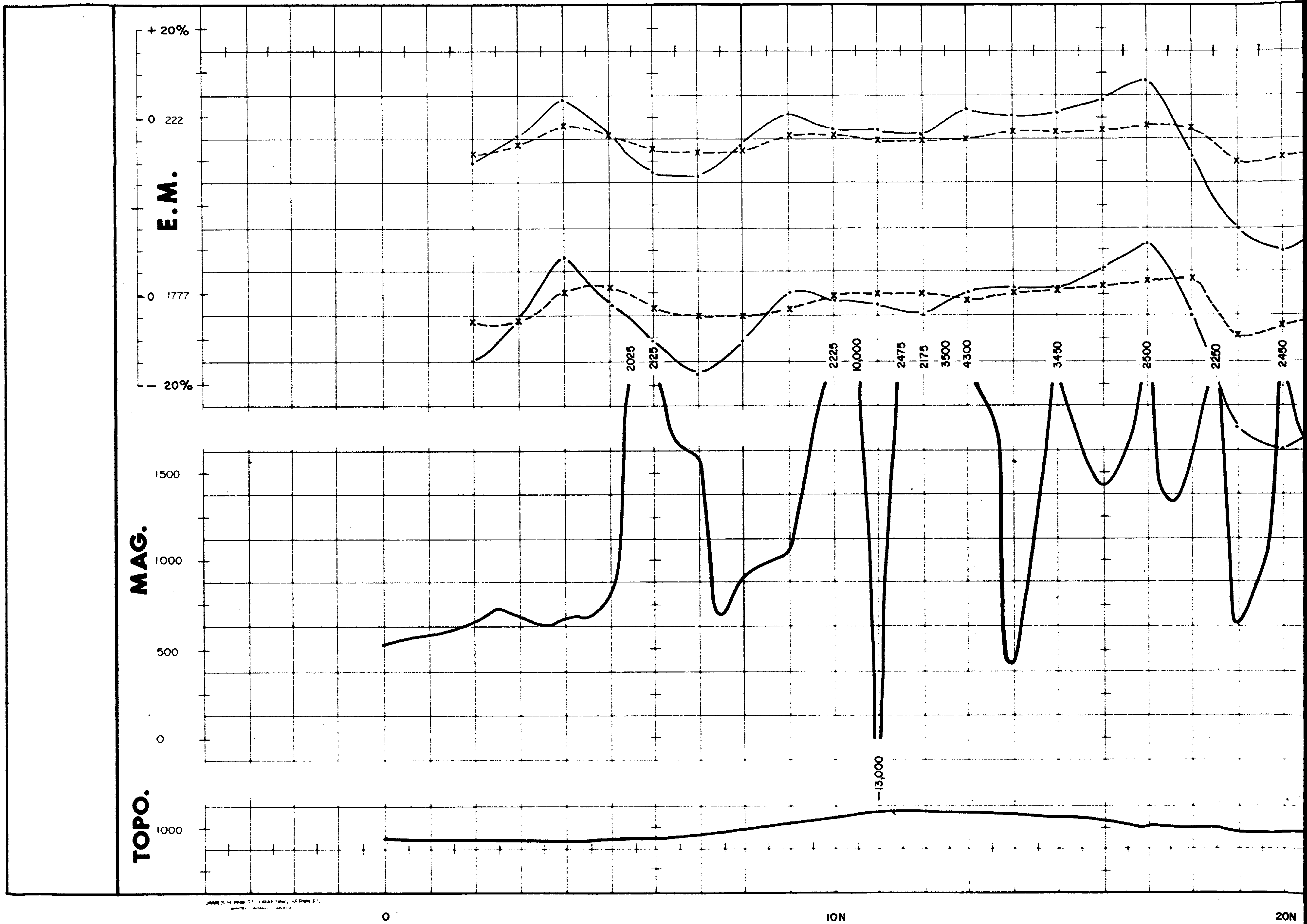

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0 222
0 1777
– 20%
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2225
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2475
2175
3500
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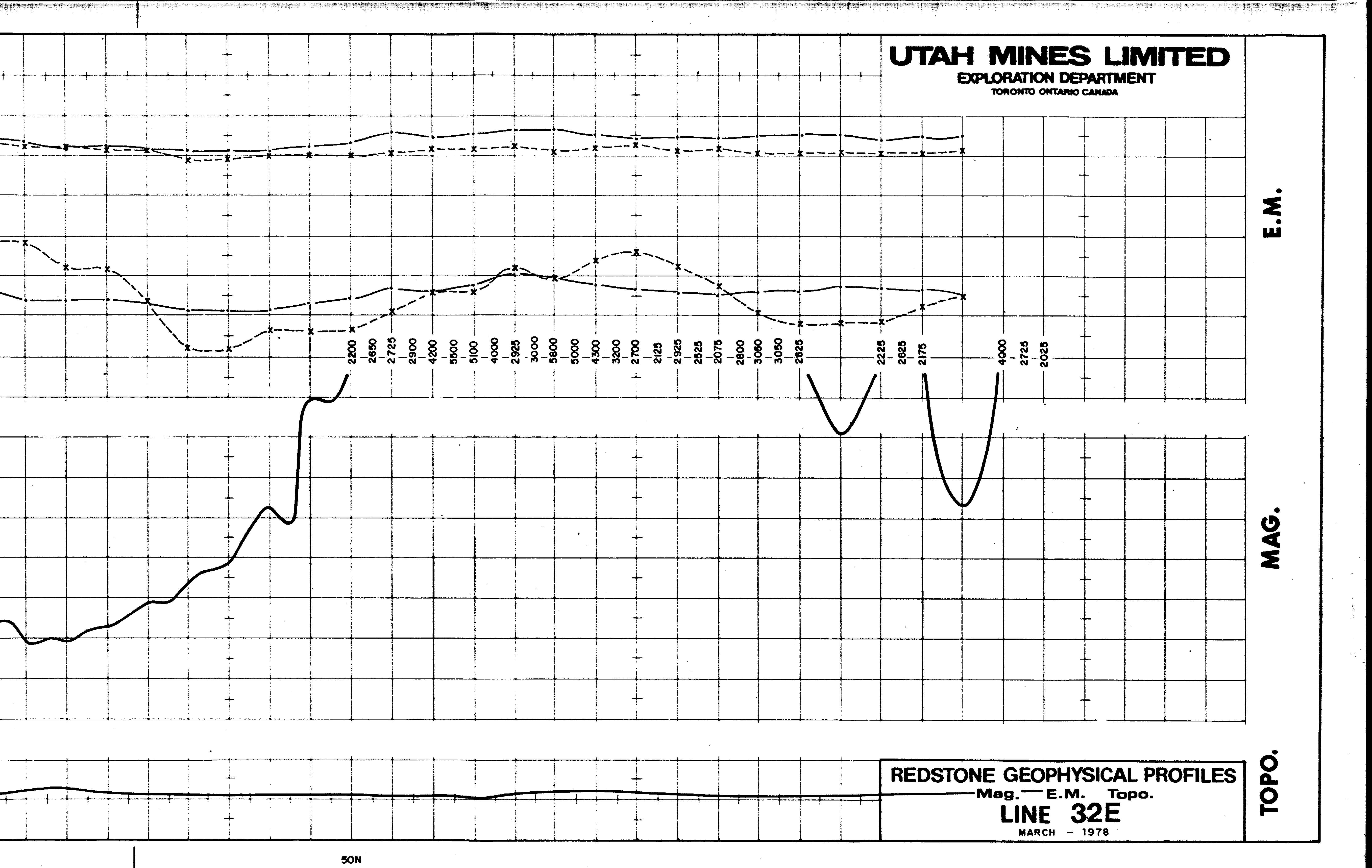

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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MAG.
TOPO.
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4200
5500
5100
4000
2925
3000
5800
5000
4300
3200
2700
2125
2925
2525
2075
2800
3050
3050
2825
2225
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Mag. — E.M. Topo.
LINE 32E
MARCH - 1978
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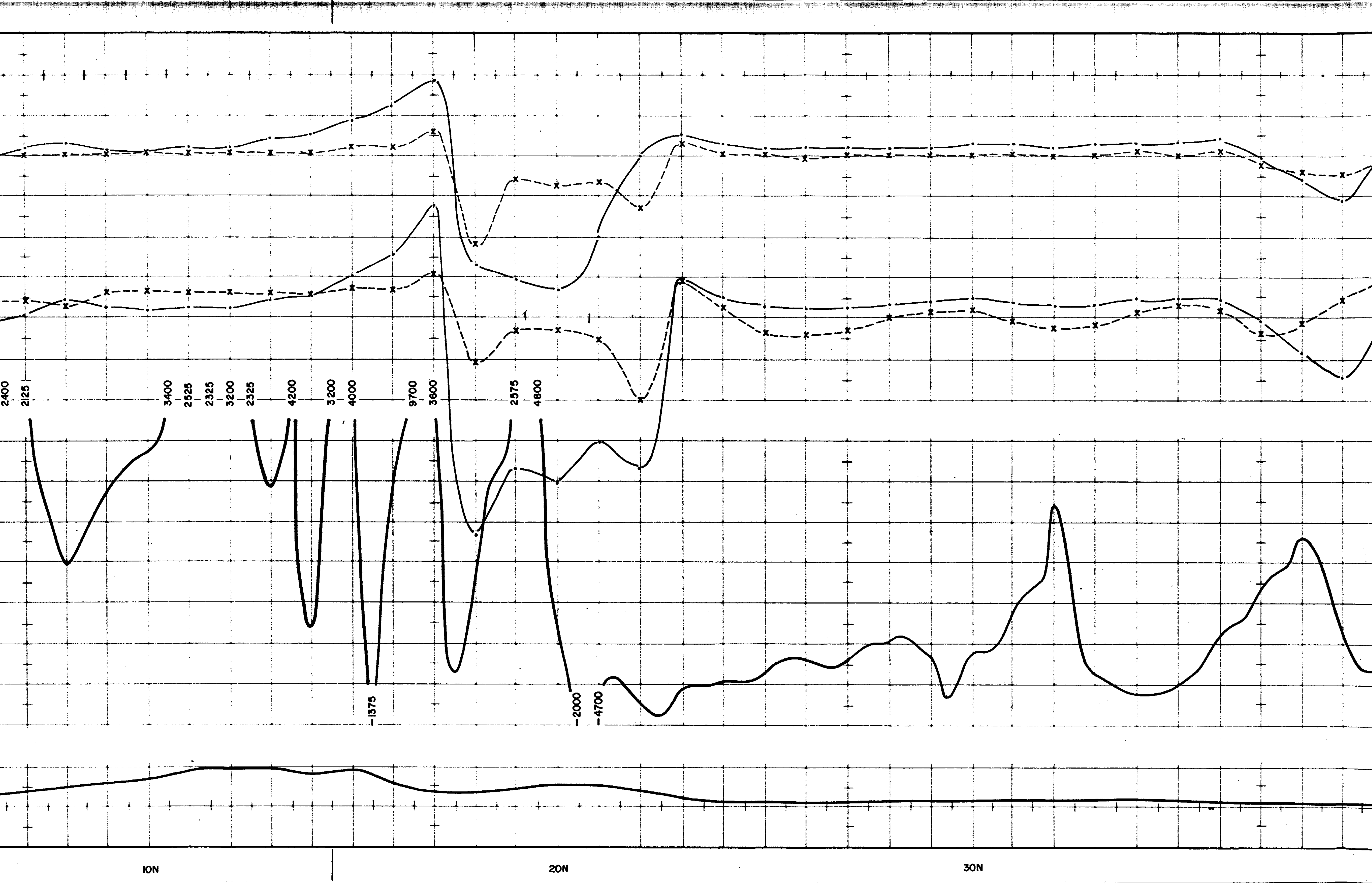

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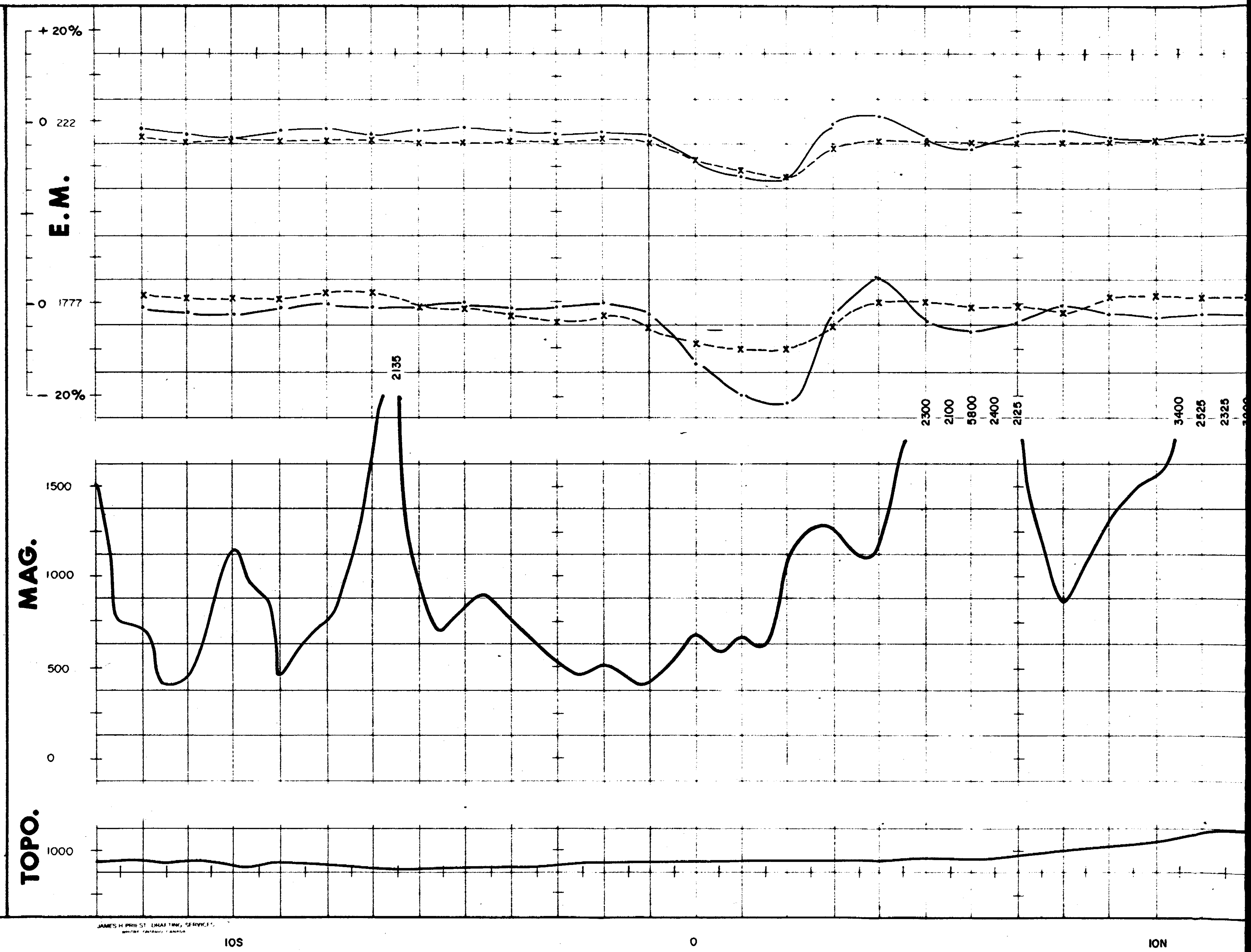

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E.M.
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MAG.
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1000
500
0
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JAMES H. PRIEST DRAFTING SERVICES
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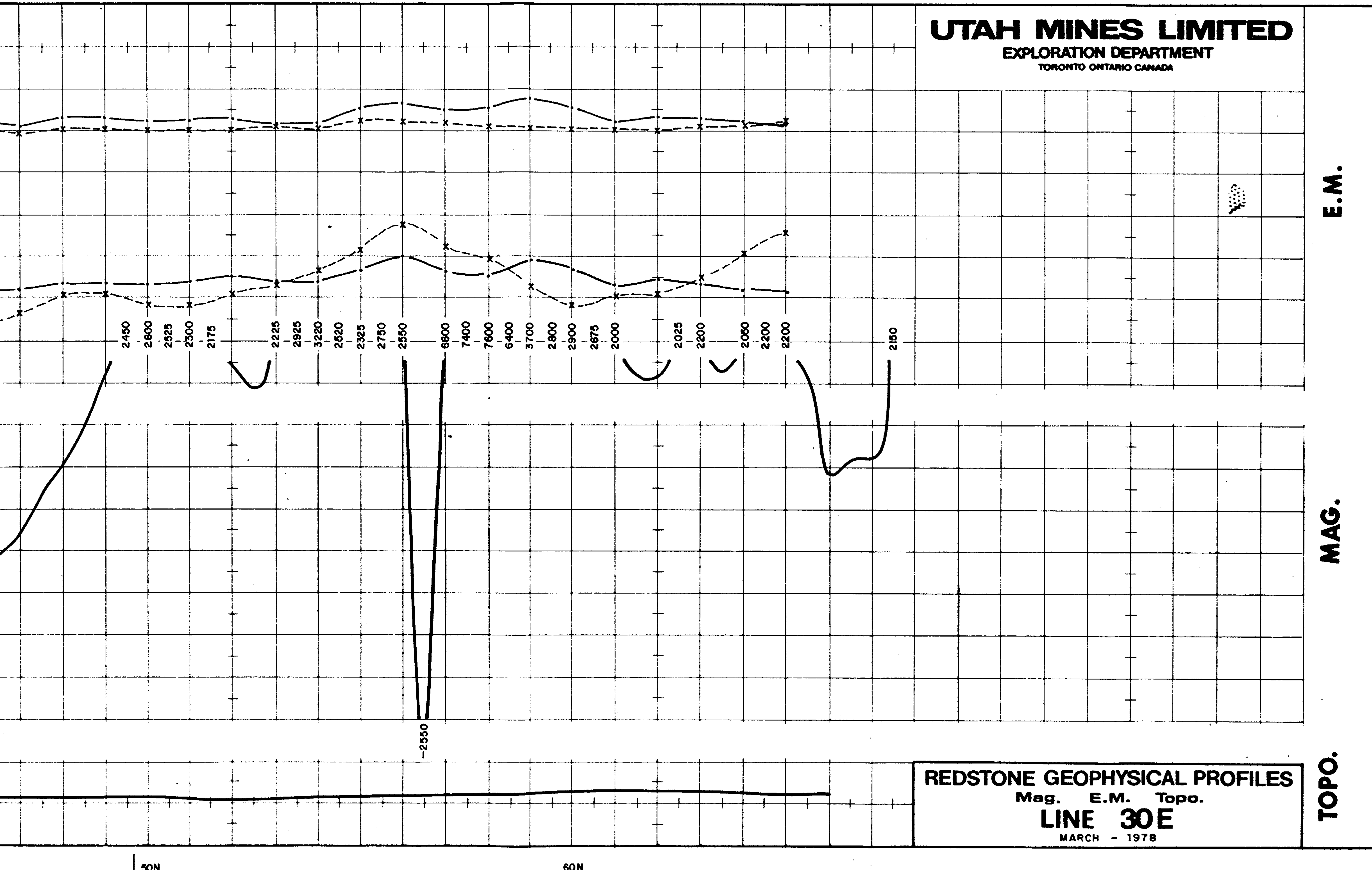
UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA



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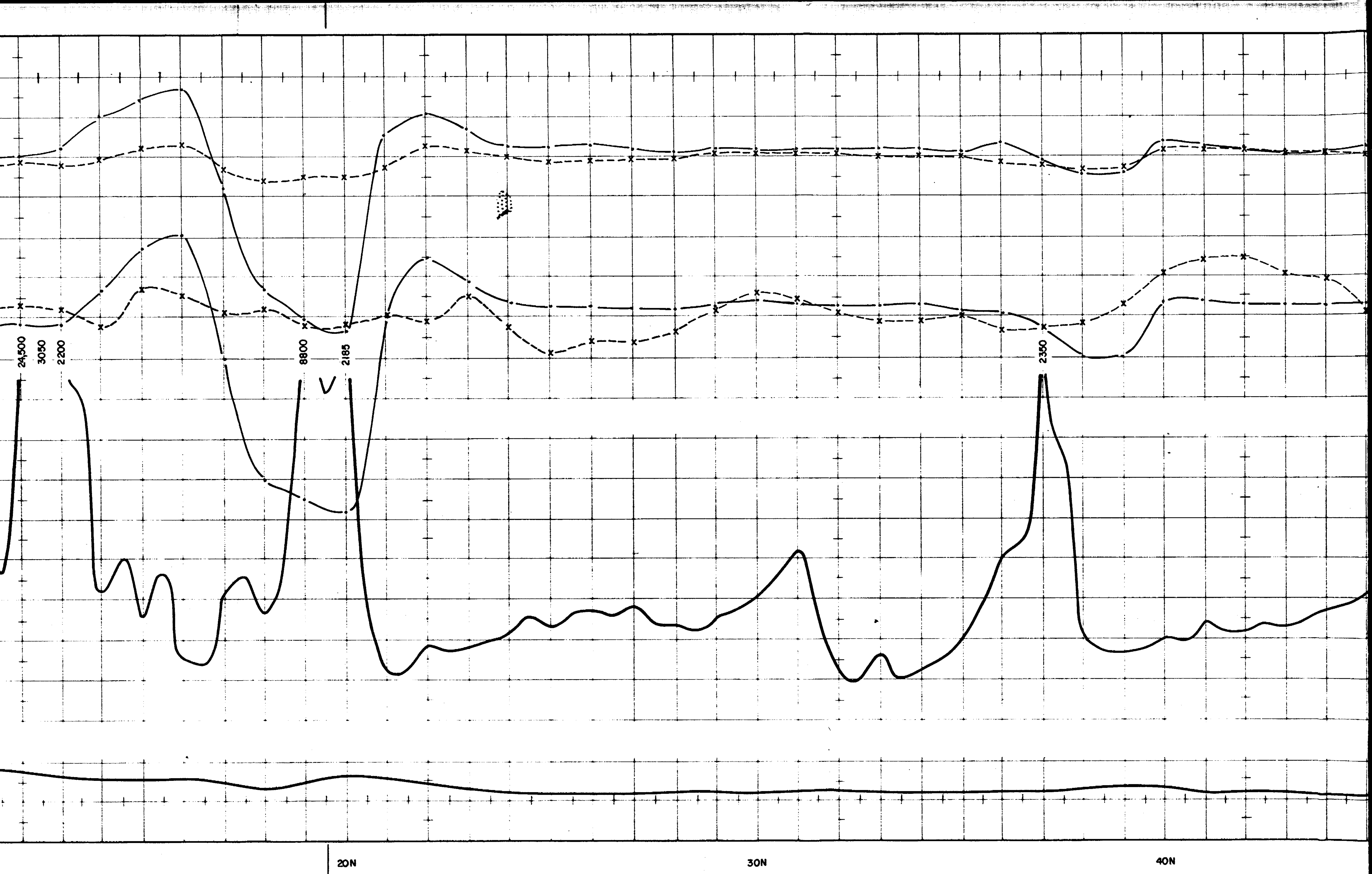
Mag. E.M. Topo.

LINE 30E

MARCH - 1978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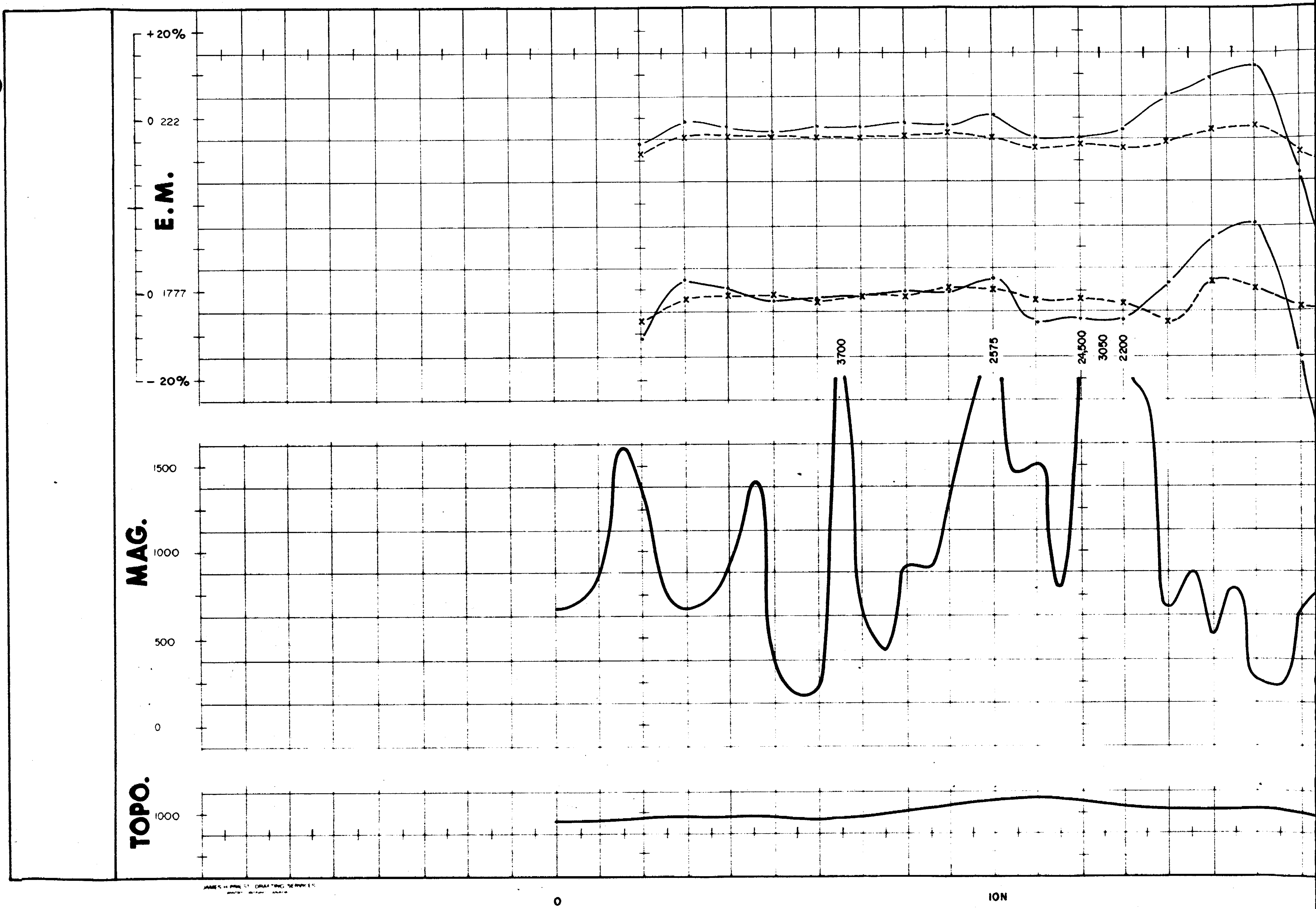

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TOPO.
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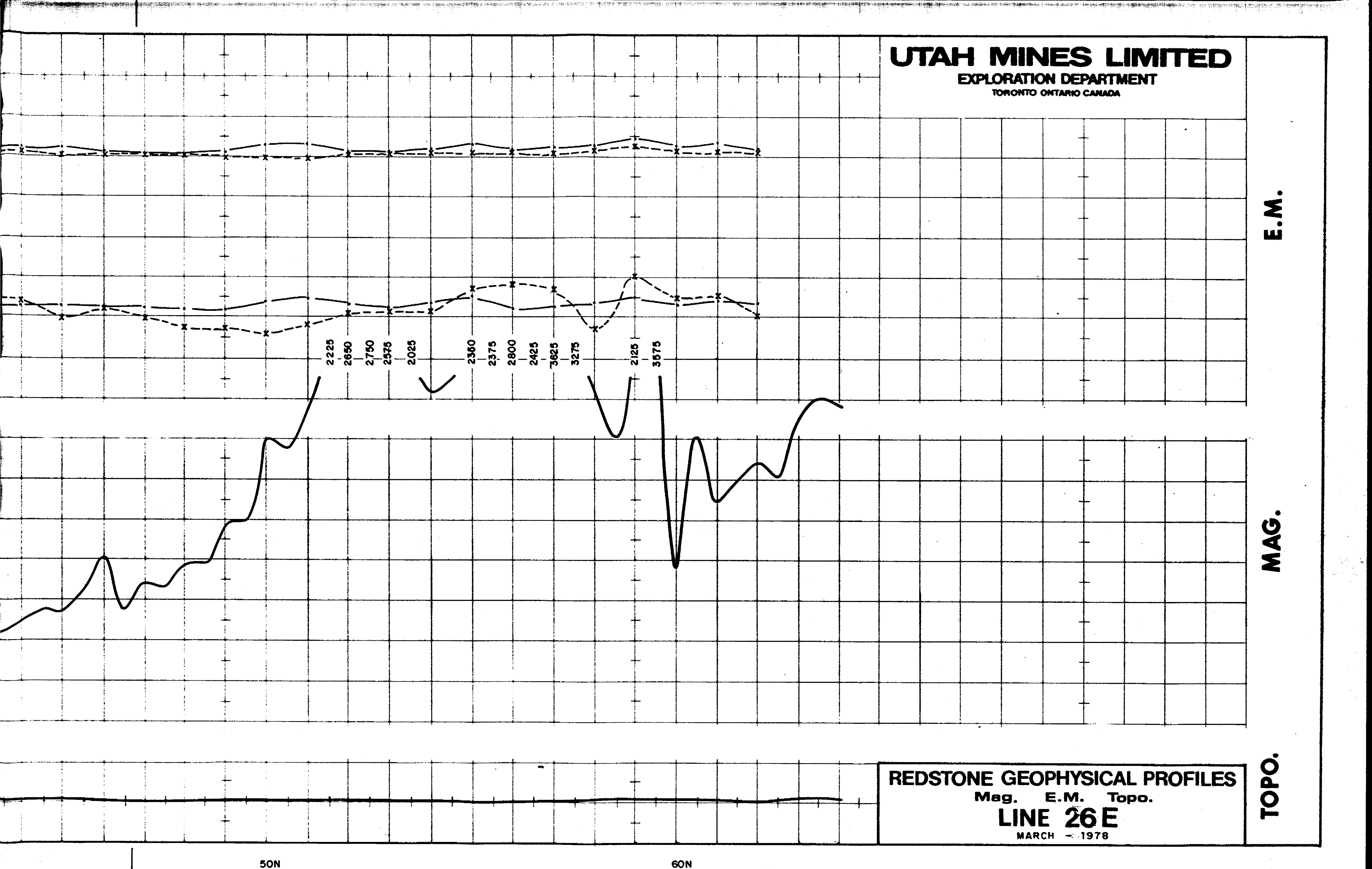
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
MAG.
TOPO.
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2360
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2800
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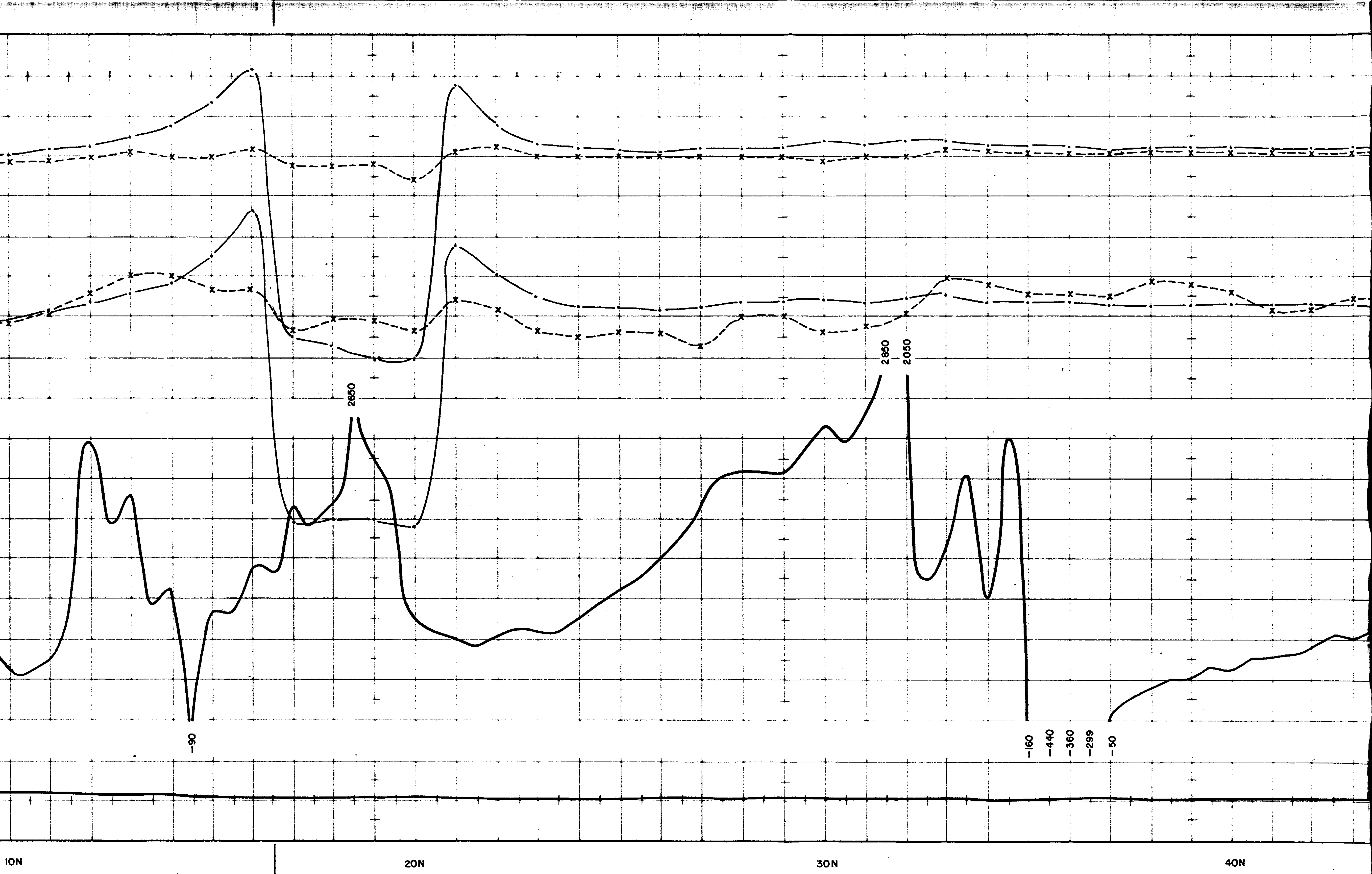
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 26E
MARCH - 1978



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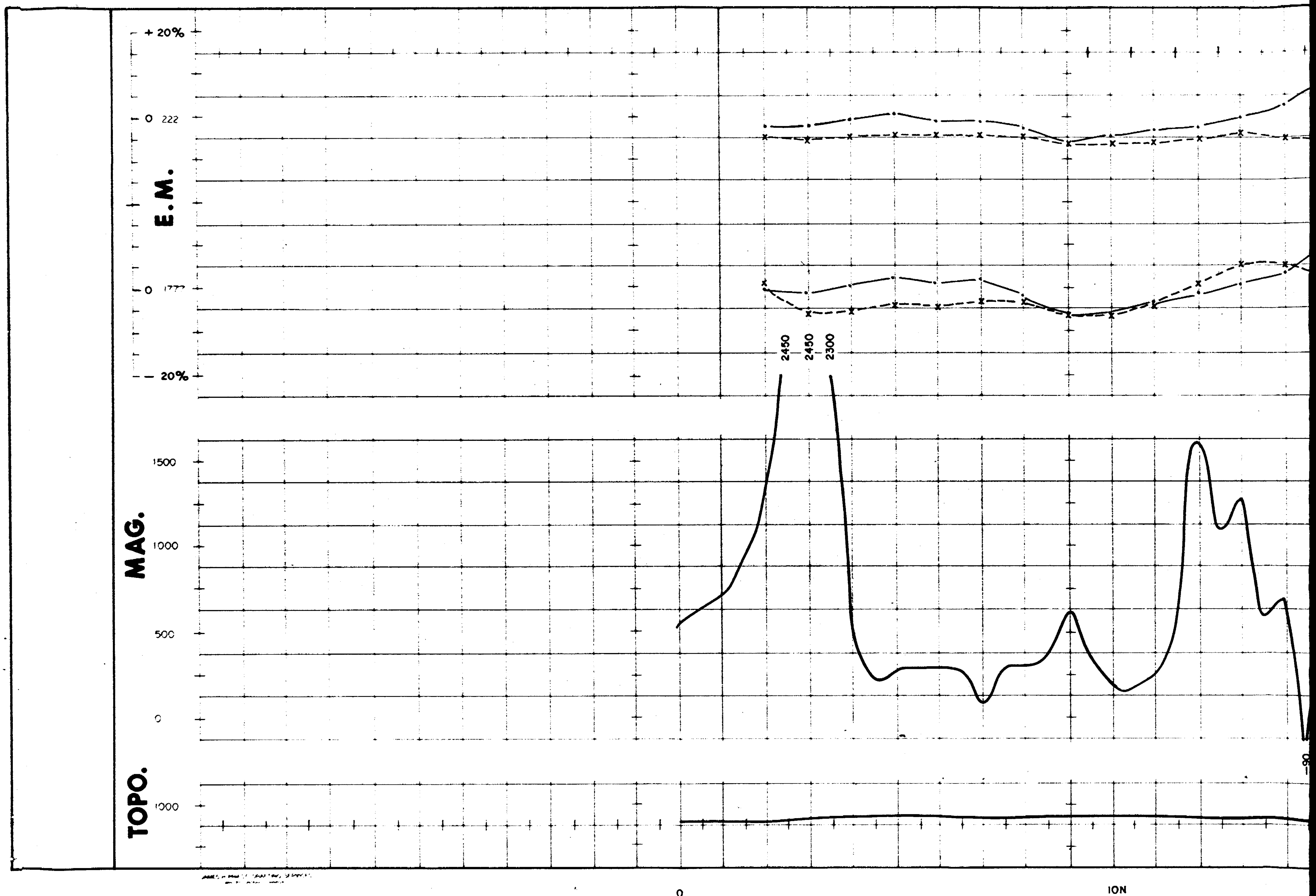
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− 20%
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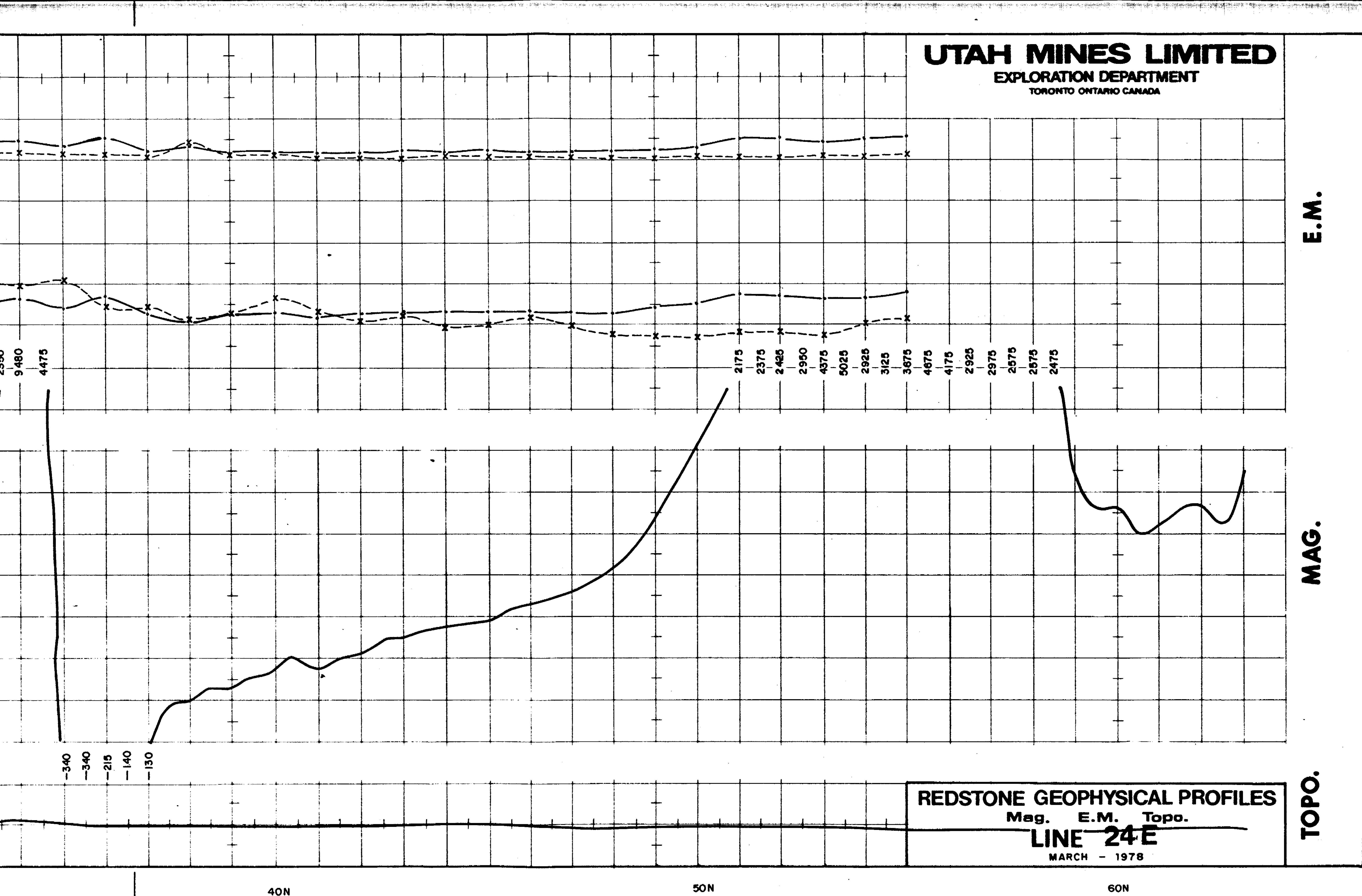

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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2975
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2575
2475
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REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 24 E
MARCH - 1978
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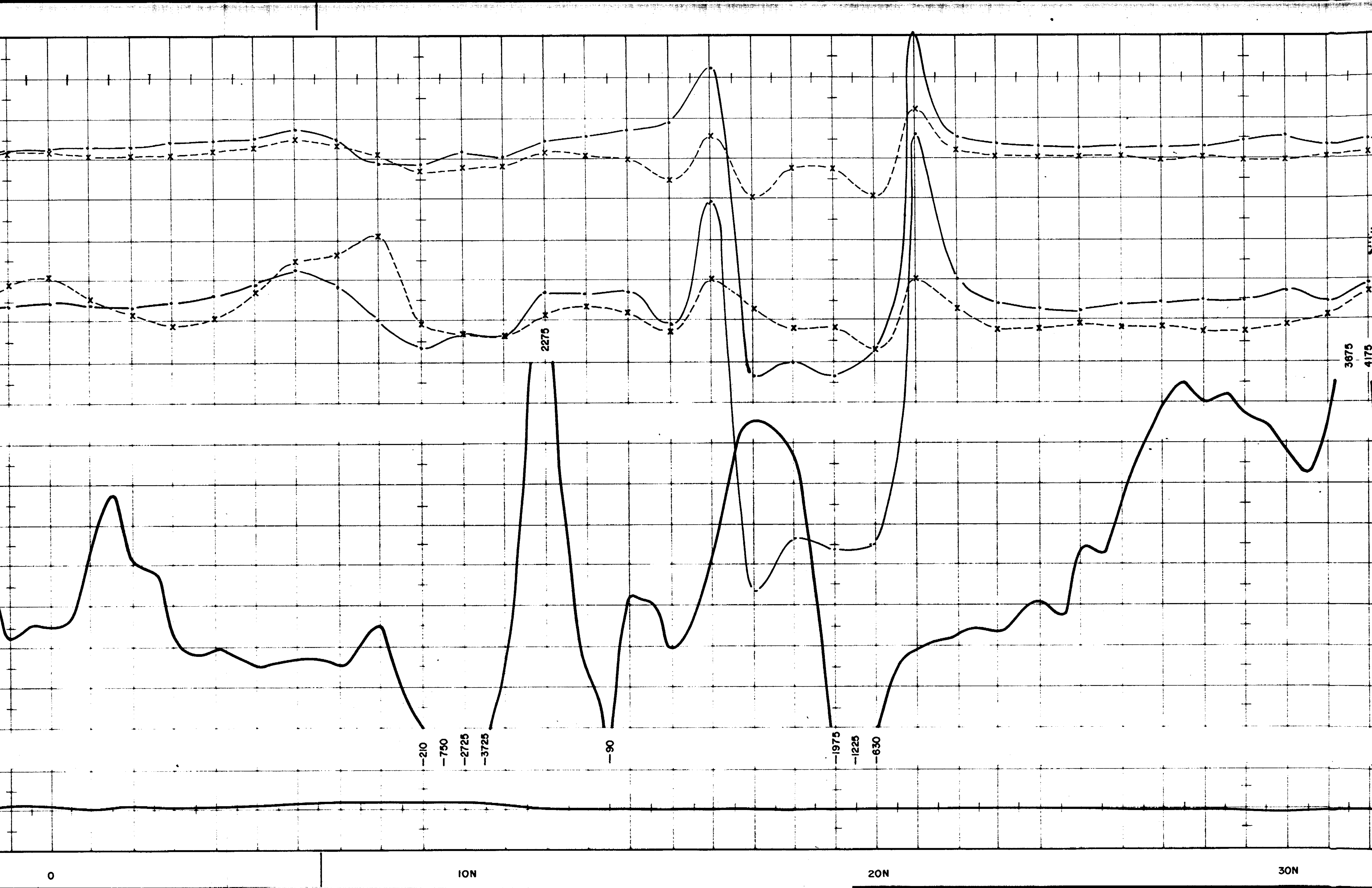
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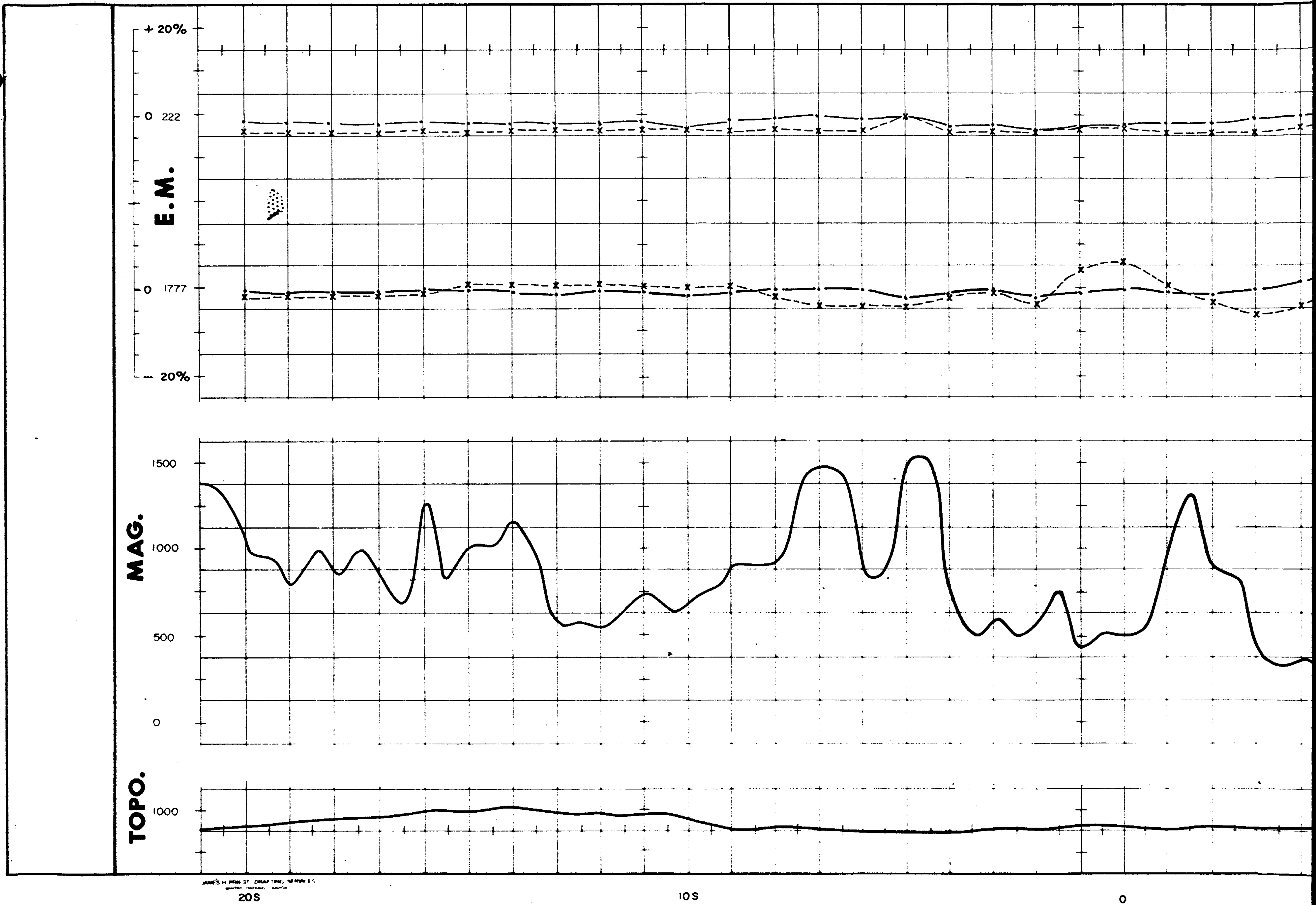

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E.M.
0 1777
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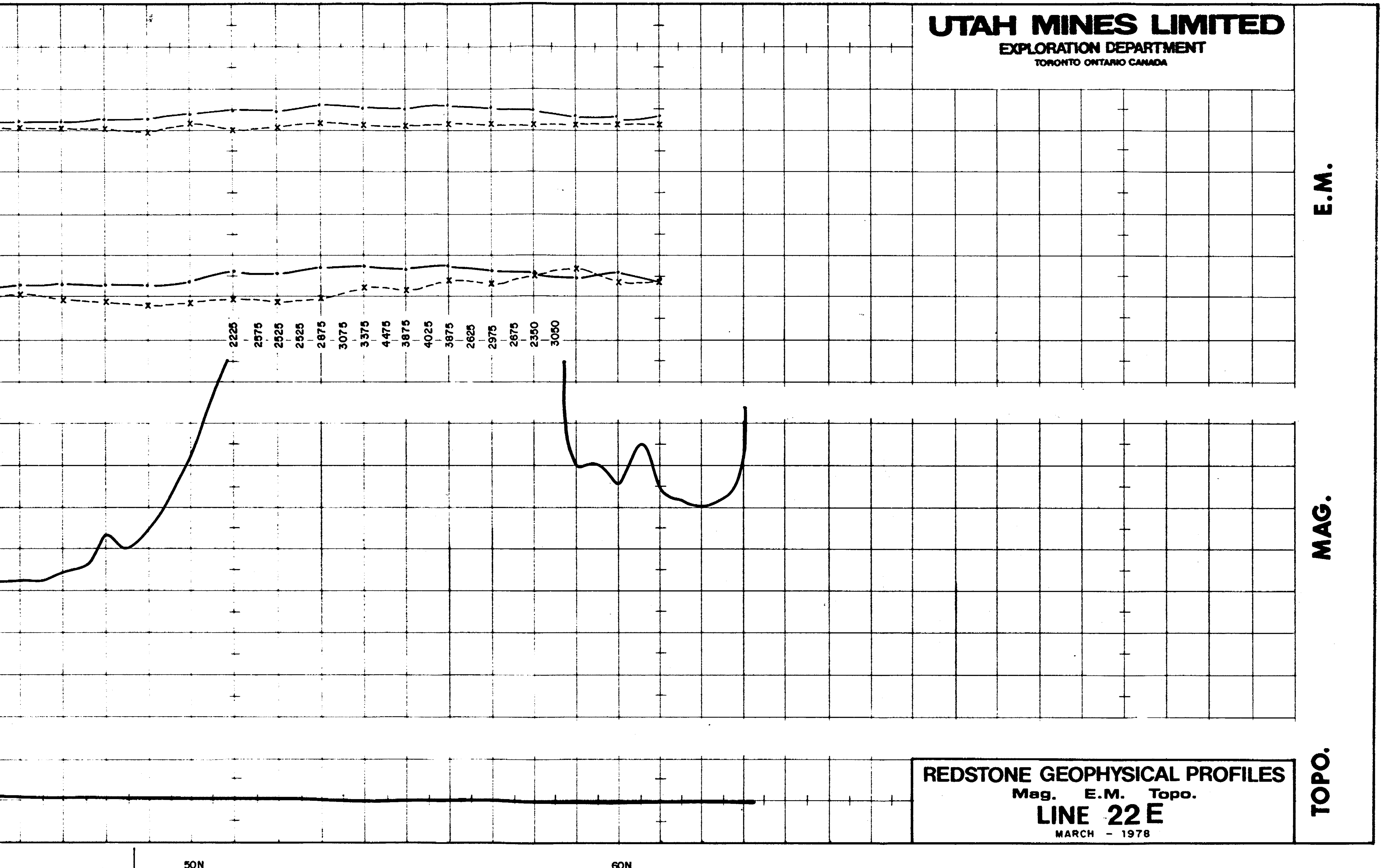
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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4475
3875
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2675
2350
3050
MAG.
TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 22E
MARCH - 1978
50N
60N

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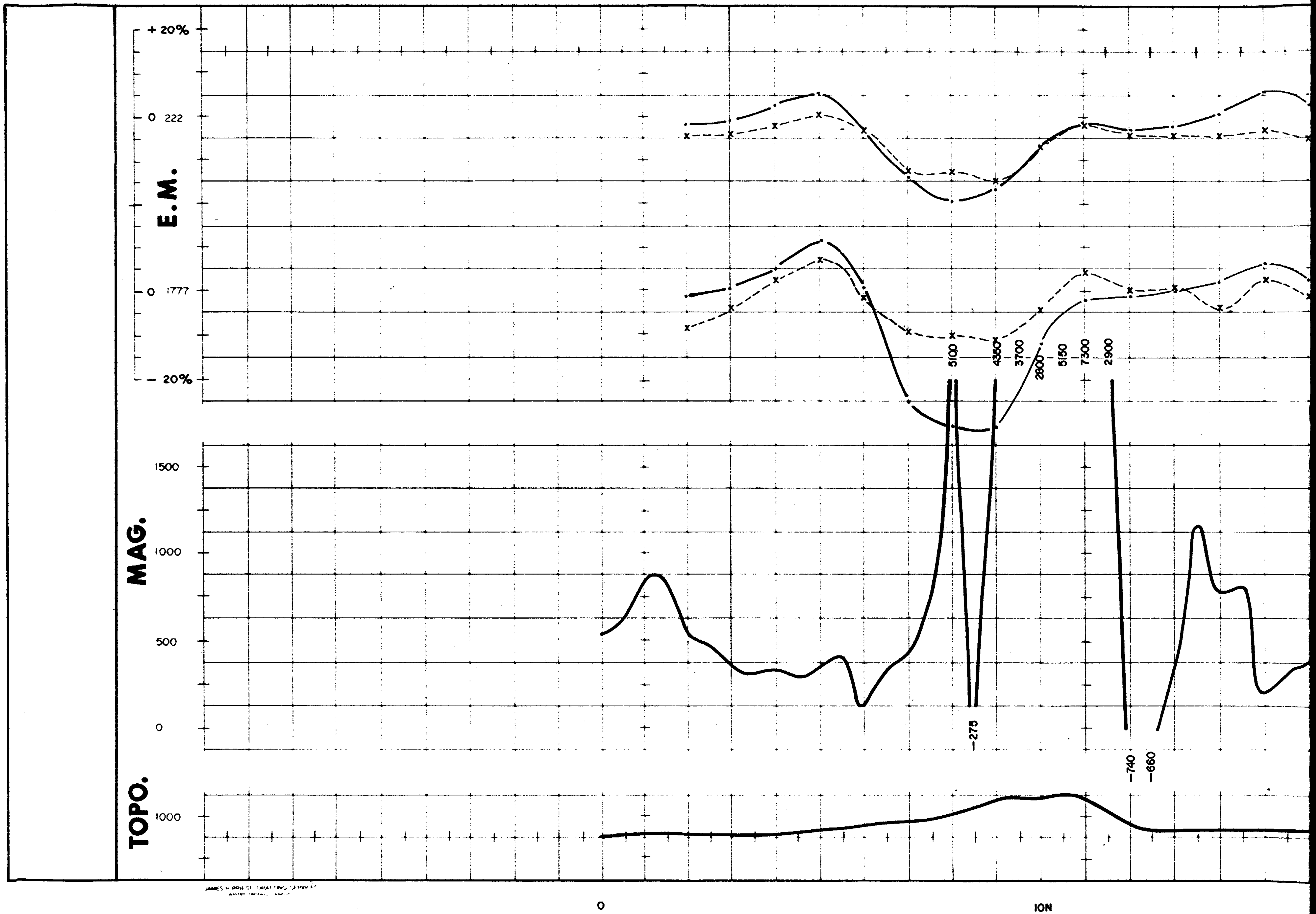
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E.M.
0 1777
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MAG.
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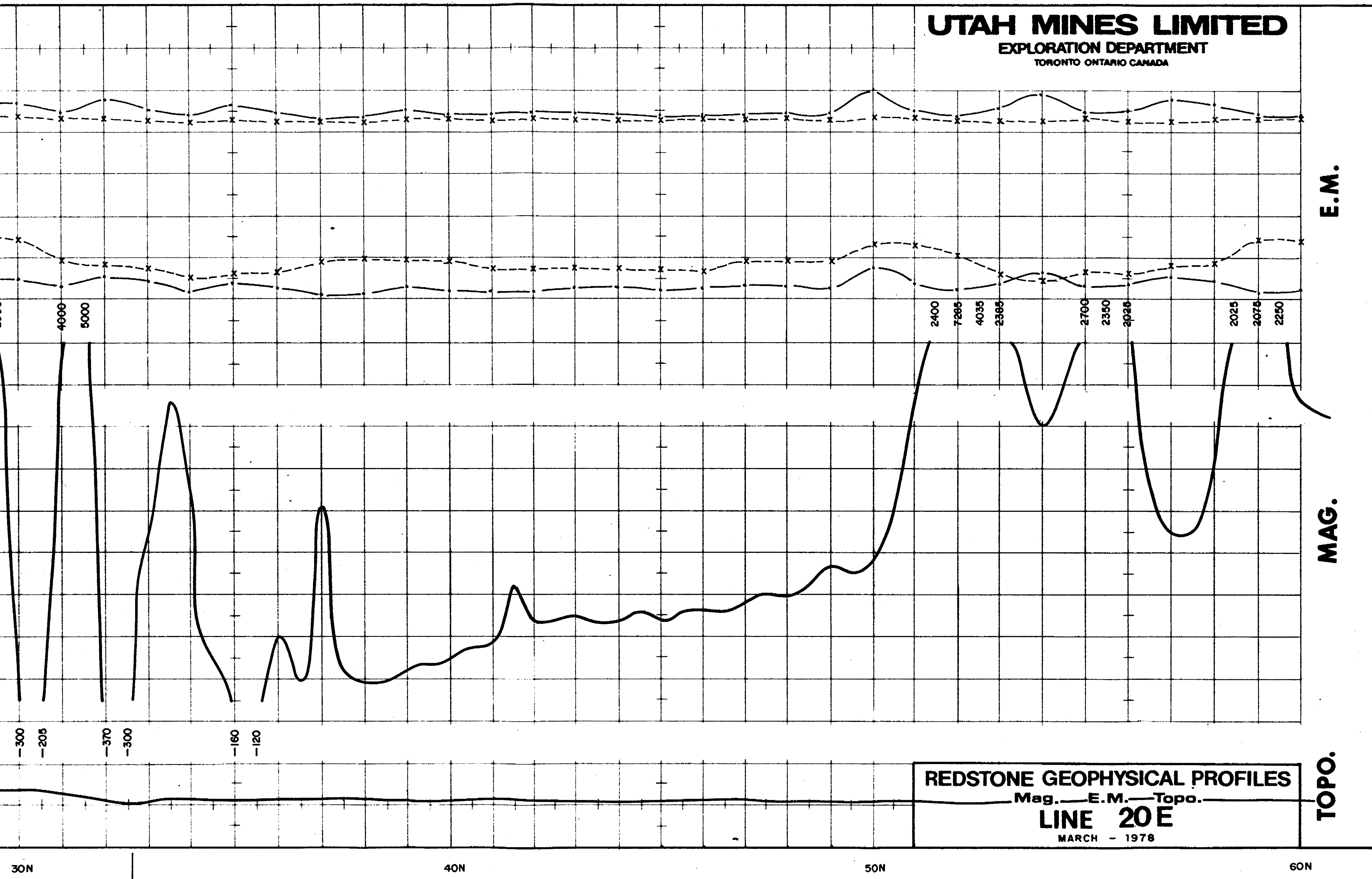
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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2385
2700
2350
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MARCH - 1978
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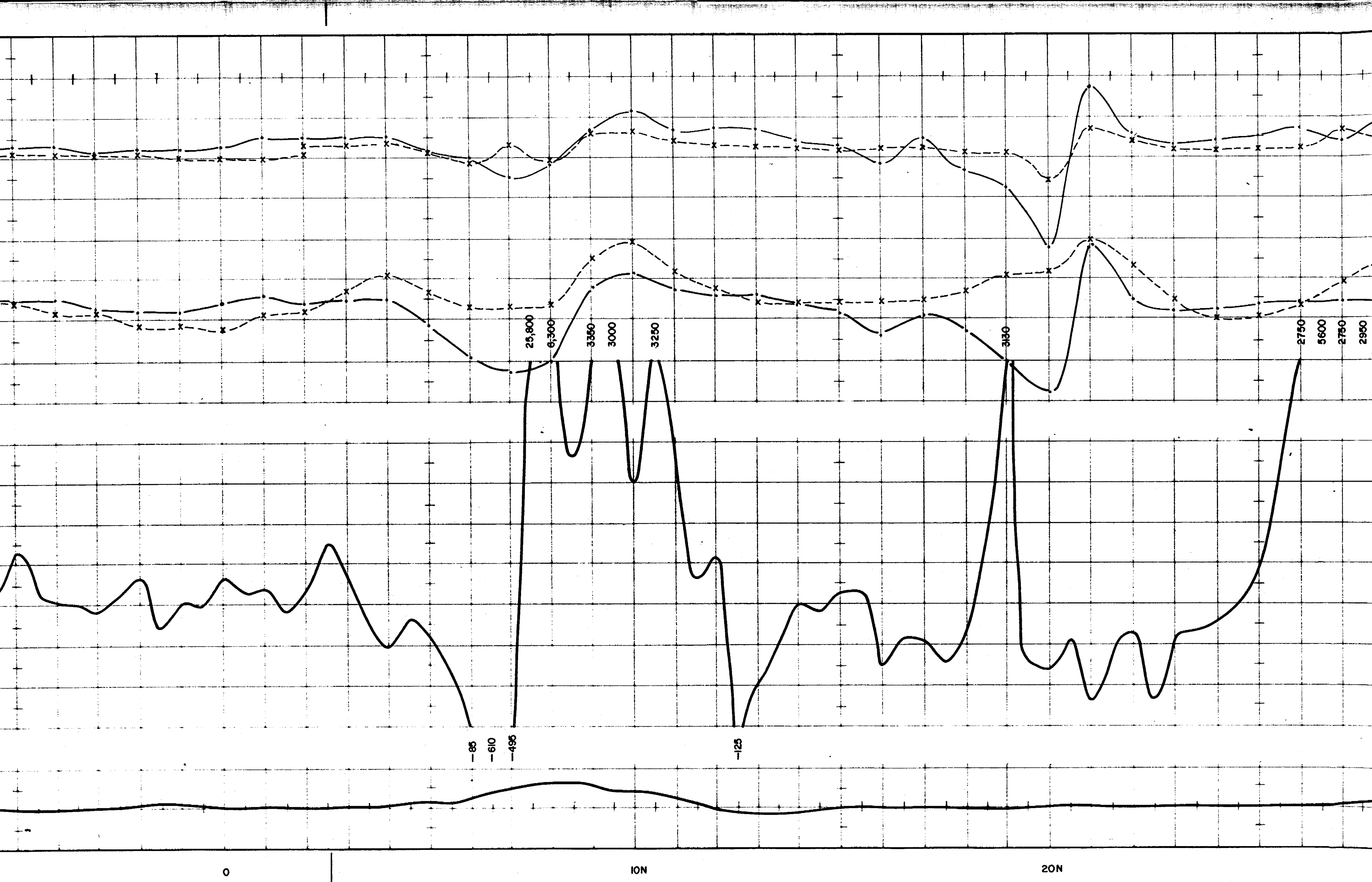
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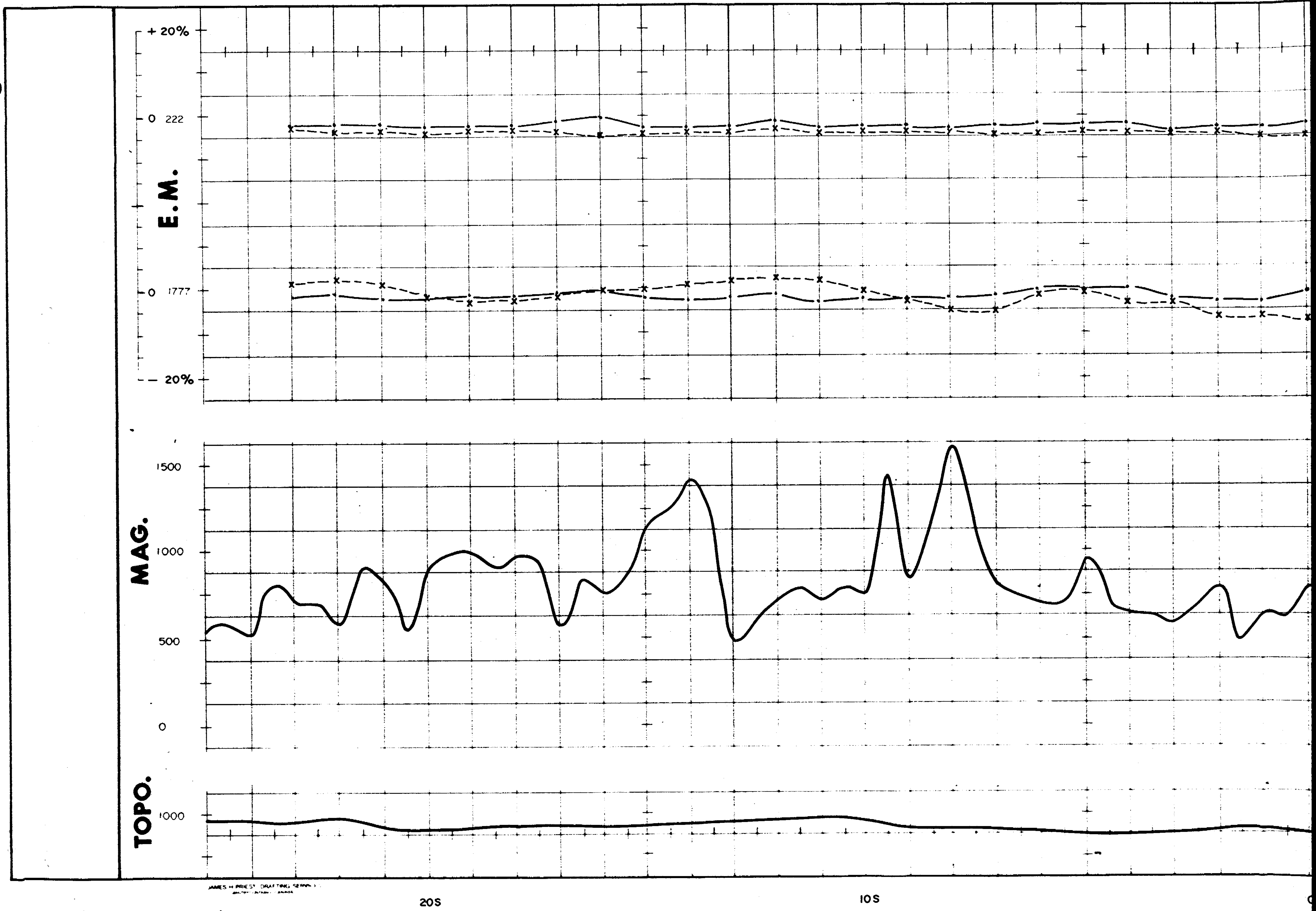
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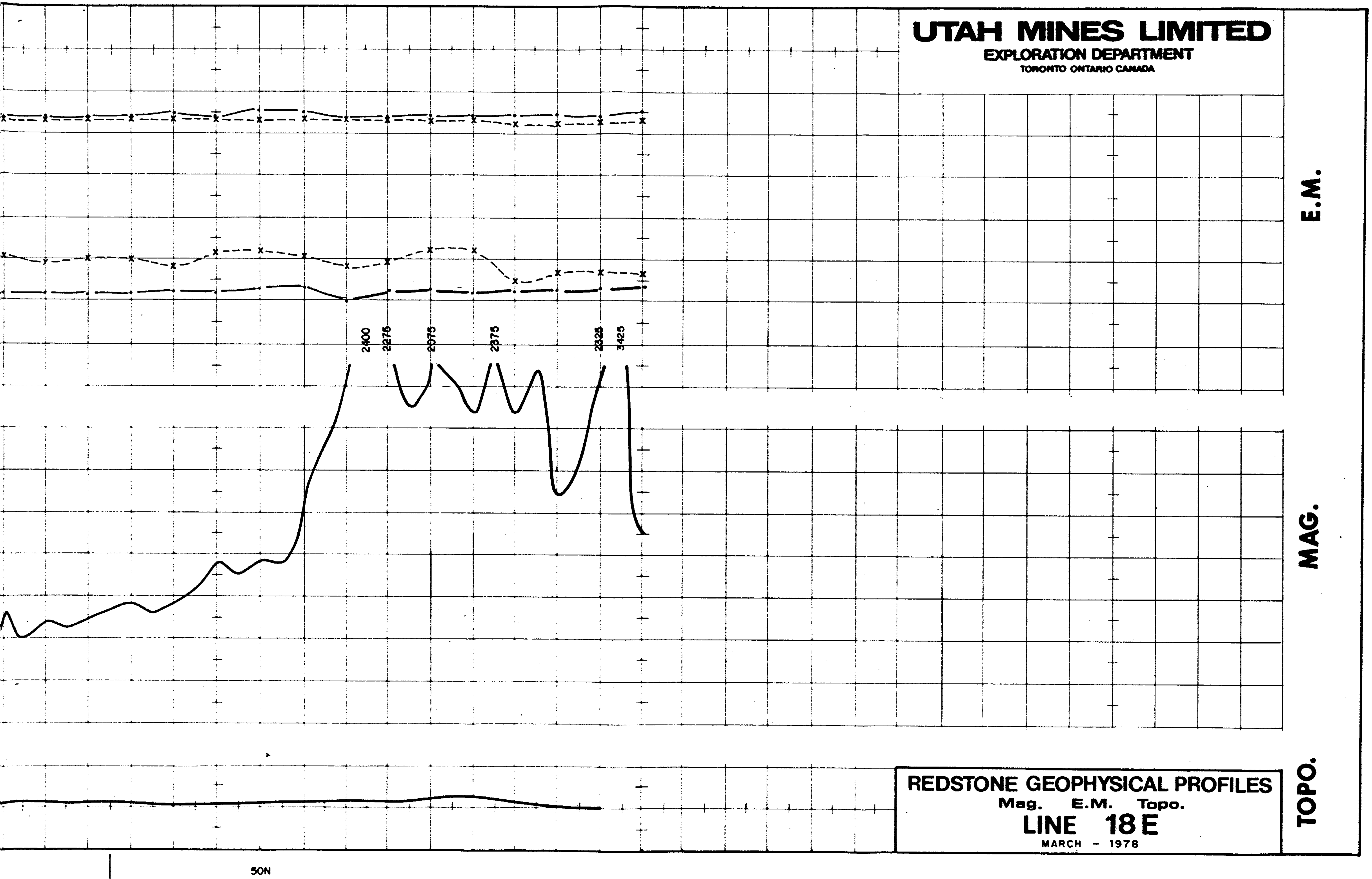
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
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MARCH - 1978
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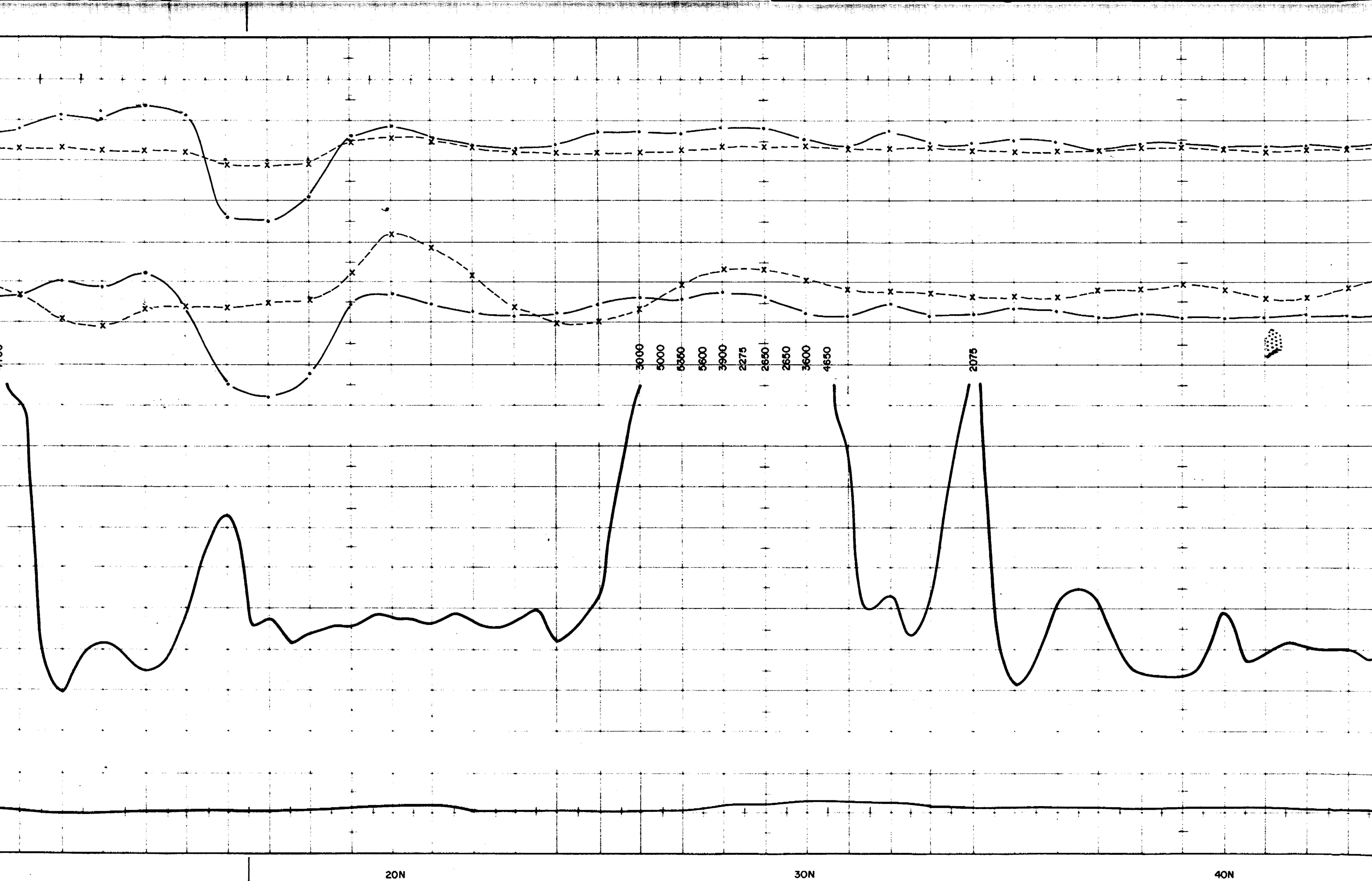
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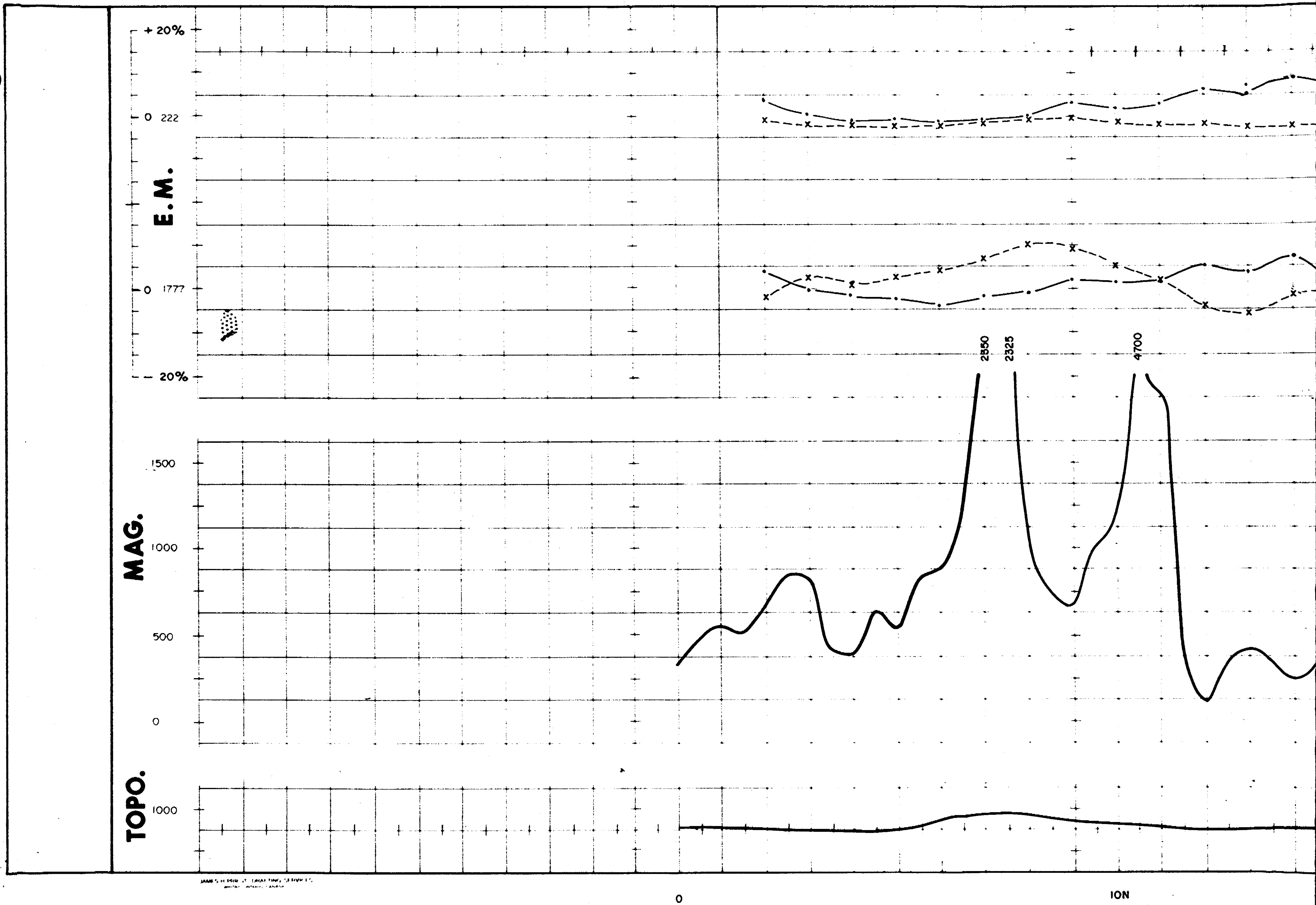

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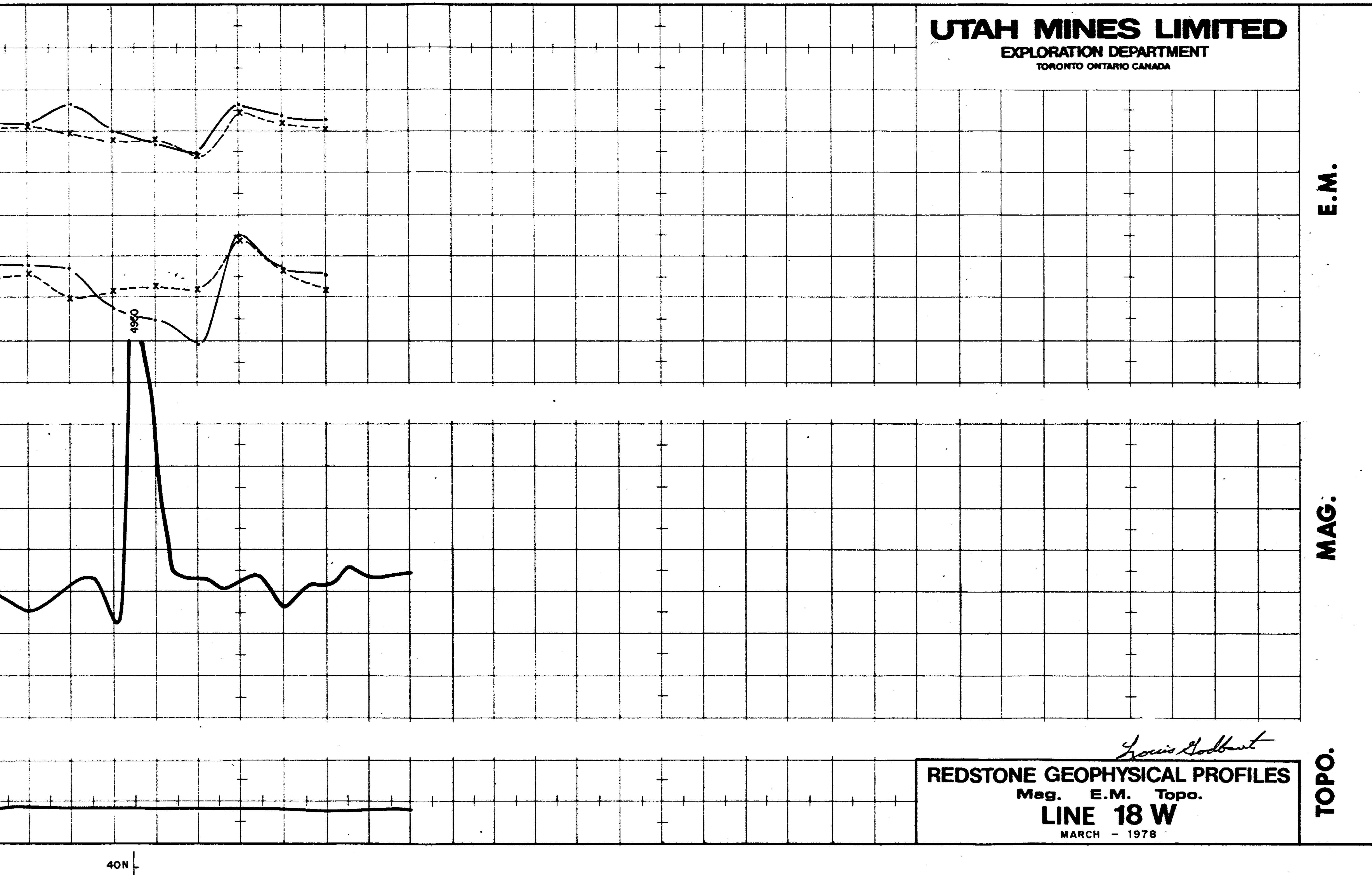


UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA

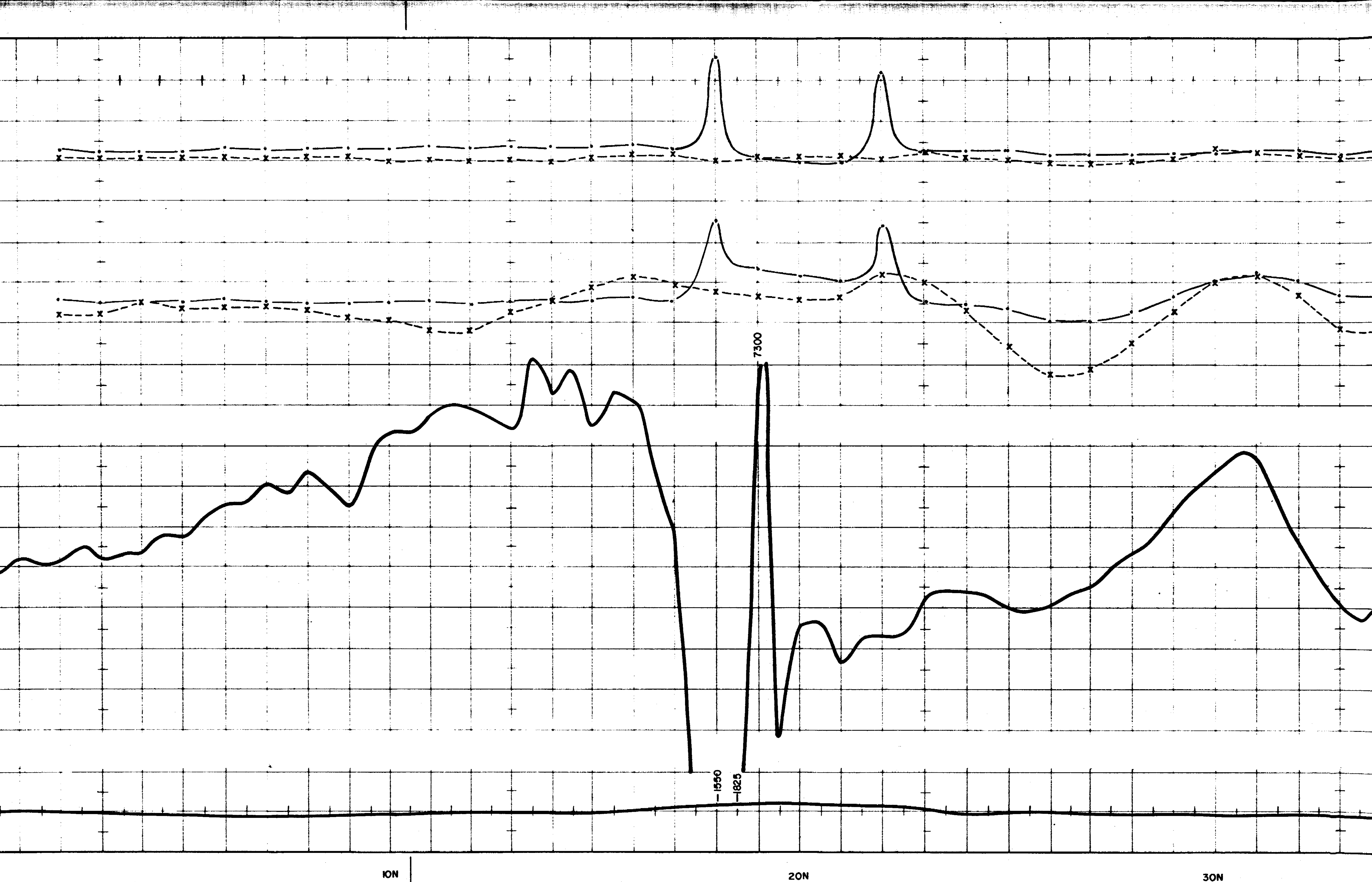
Louis Godbout

REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

LINE 18 W

MARCH - 1978



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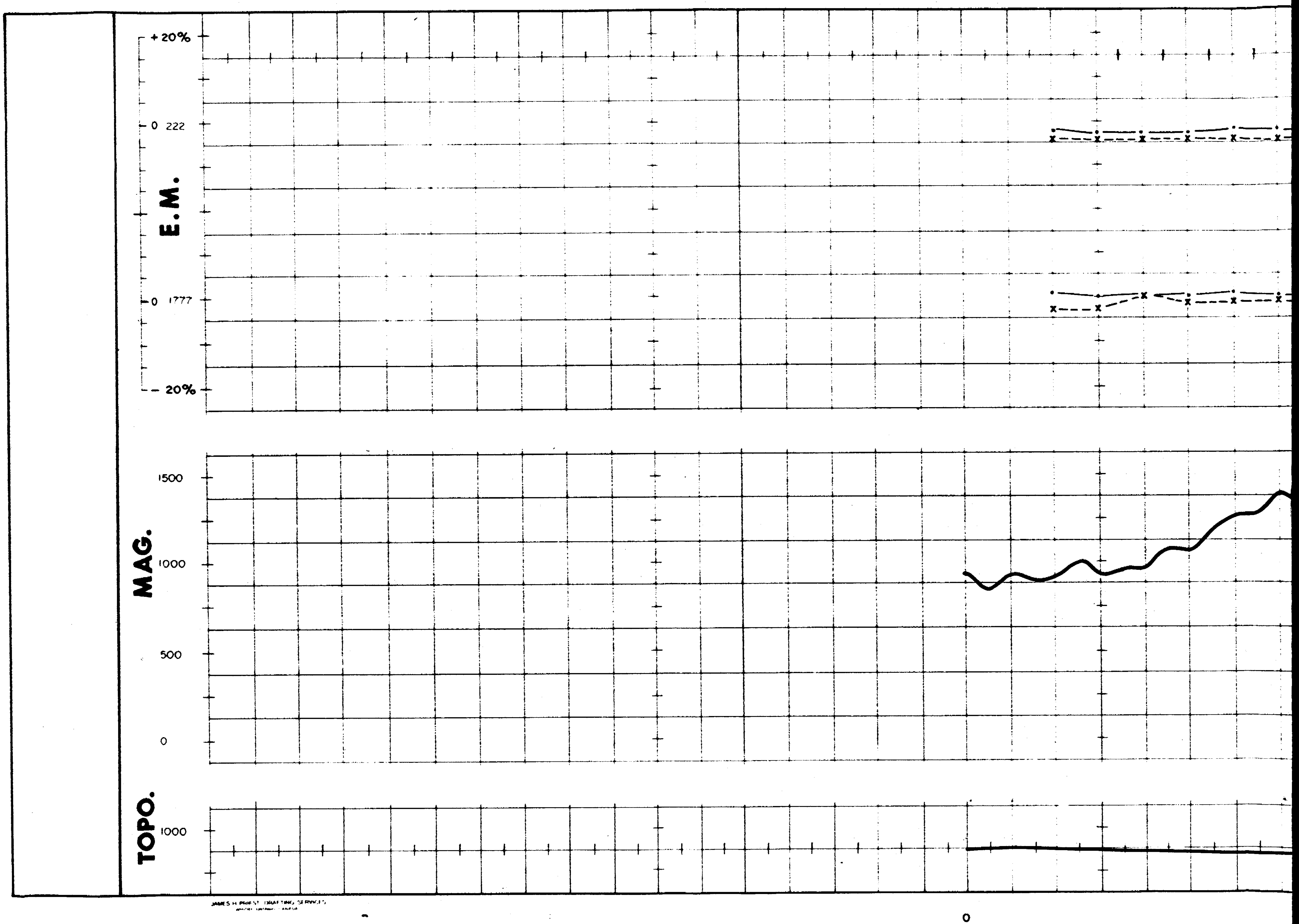
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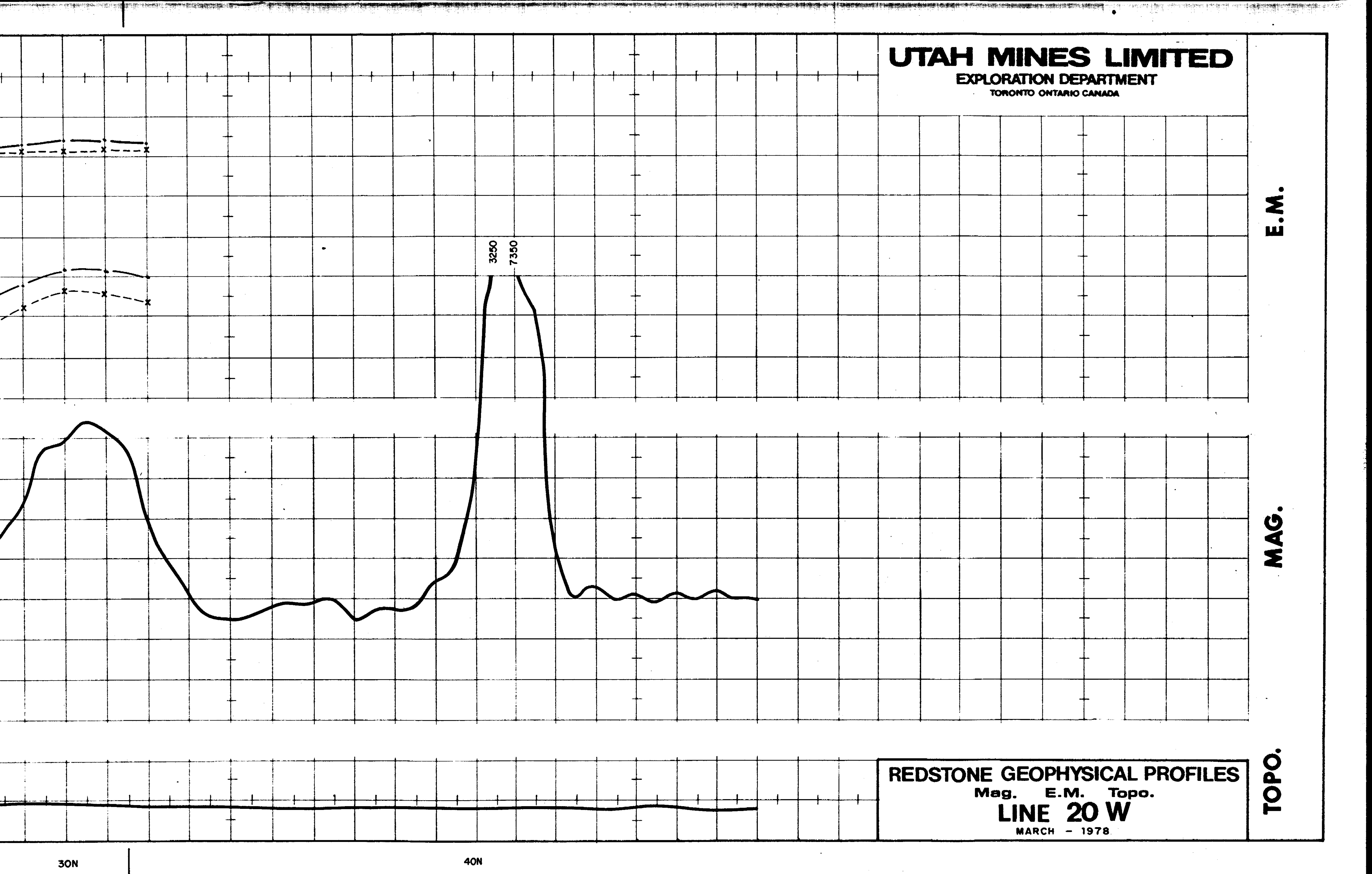
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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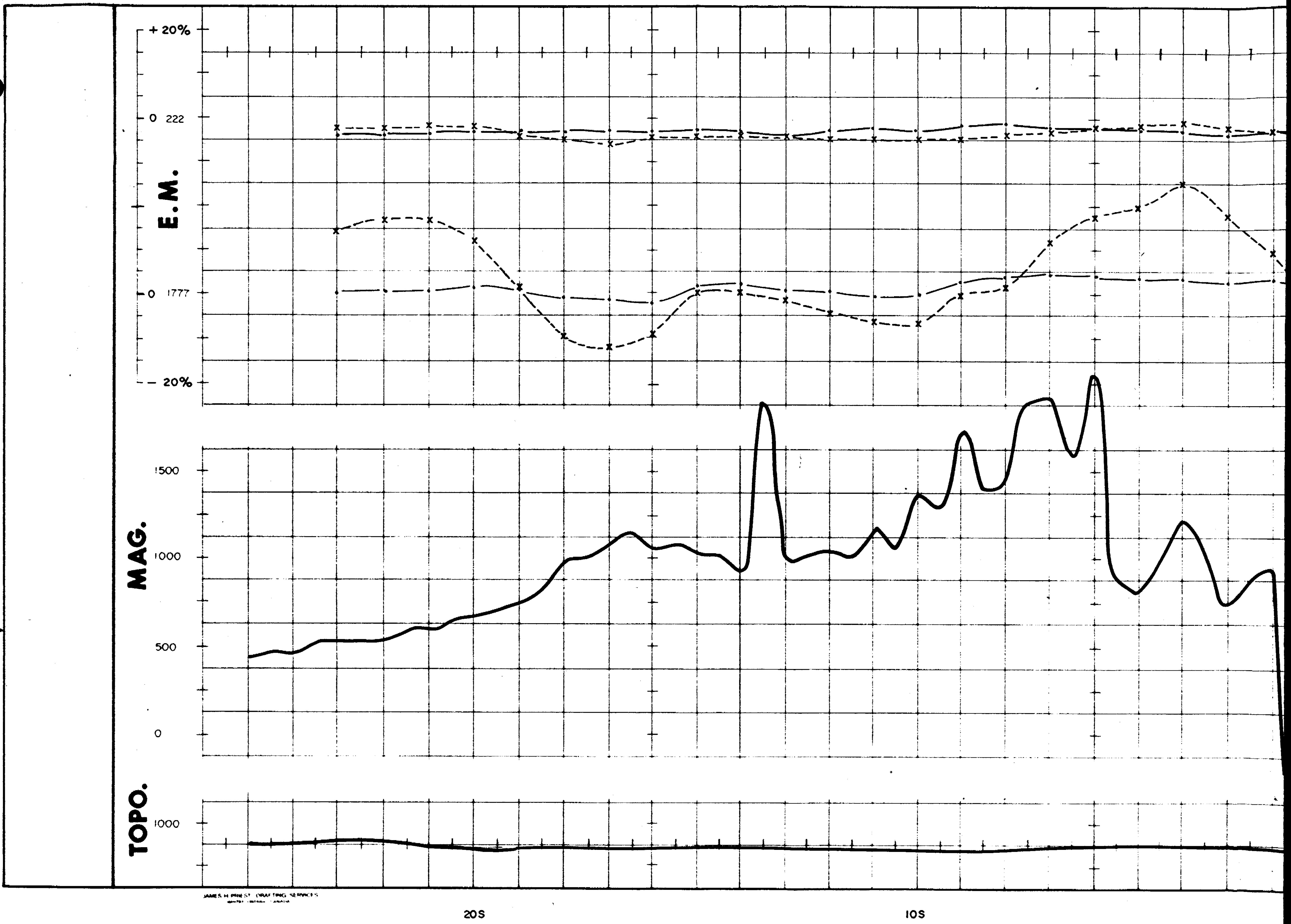
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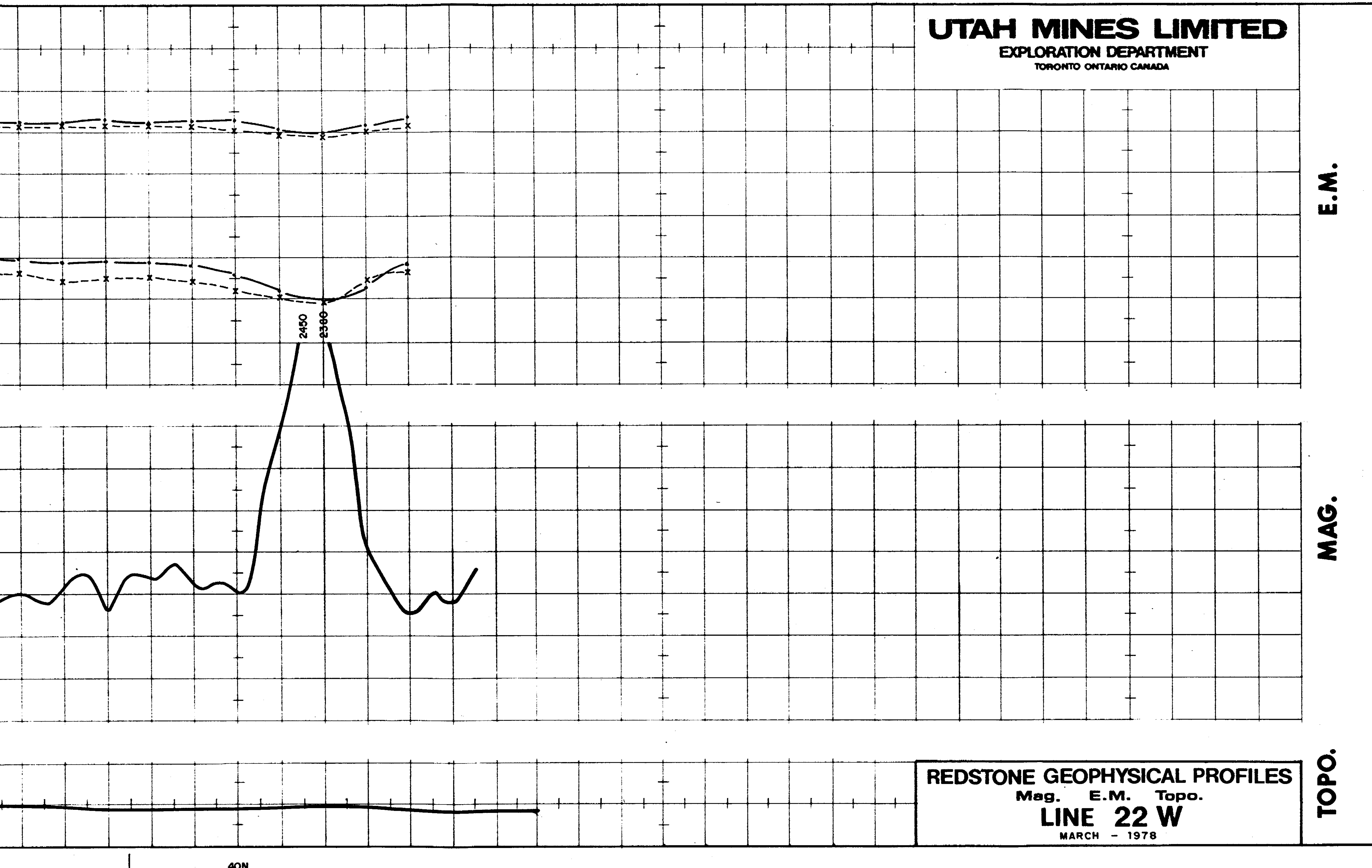
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
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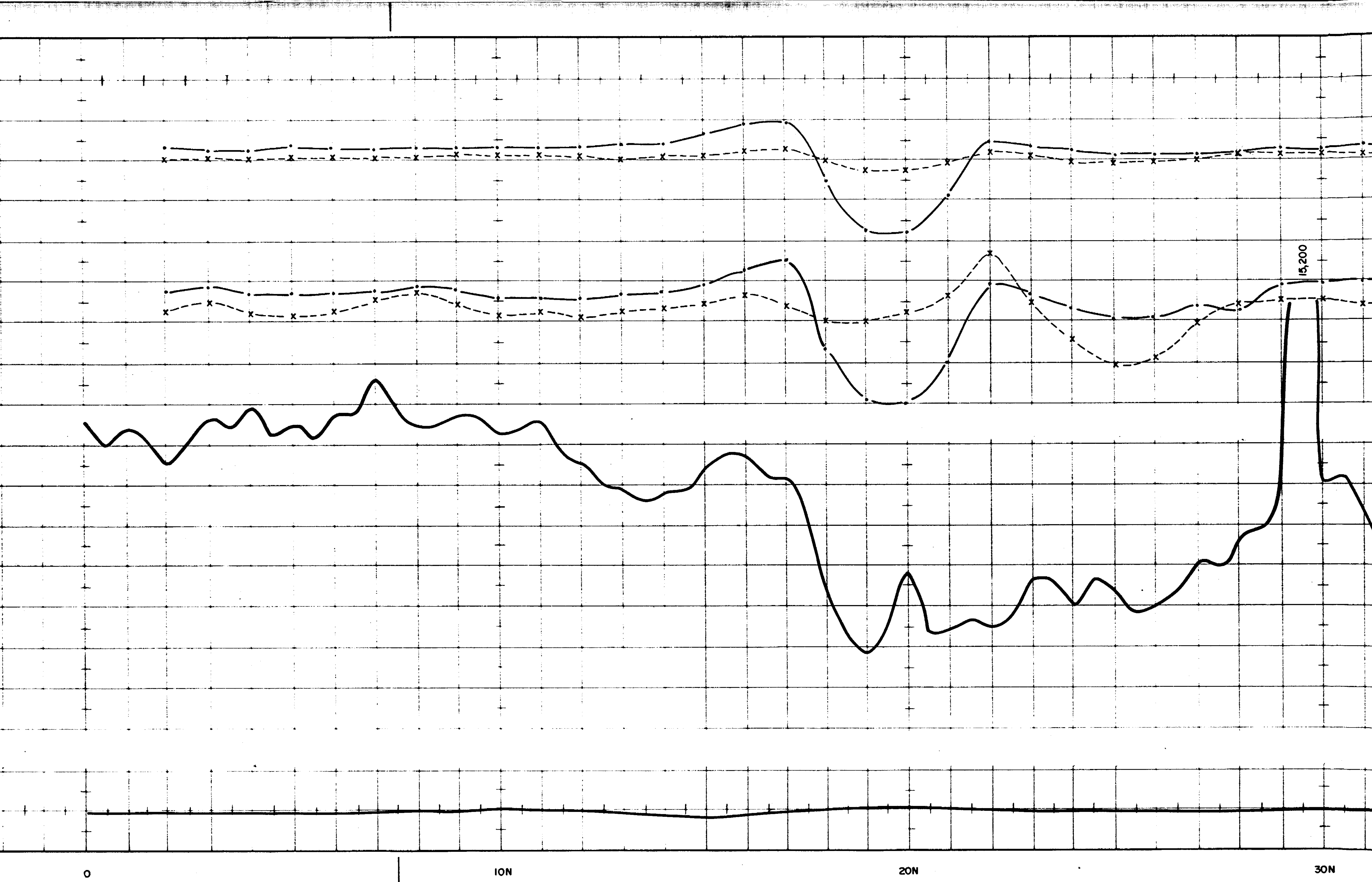
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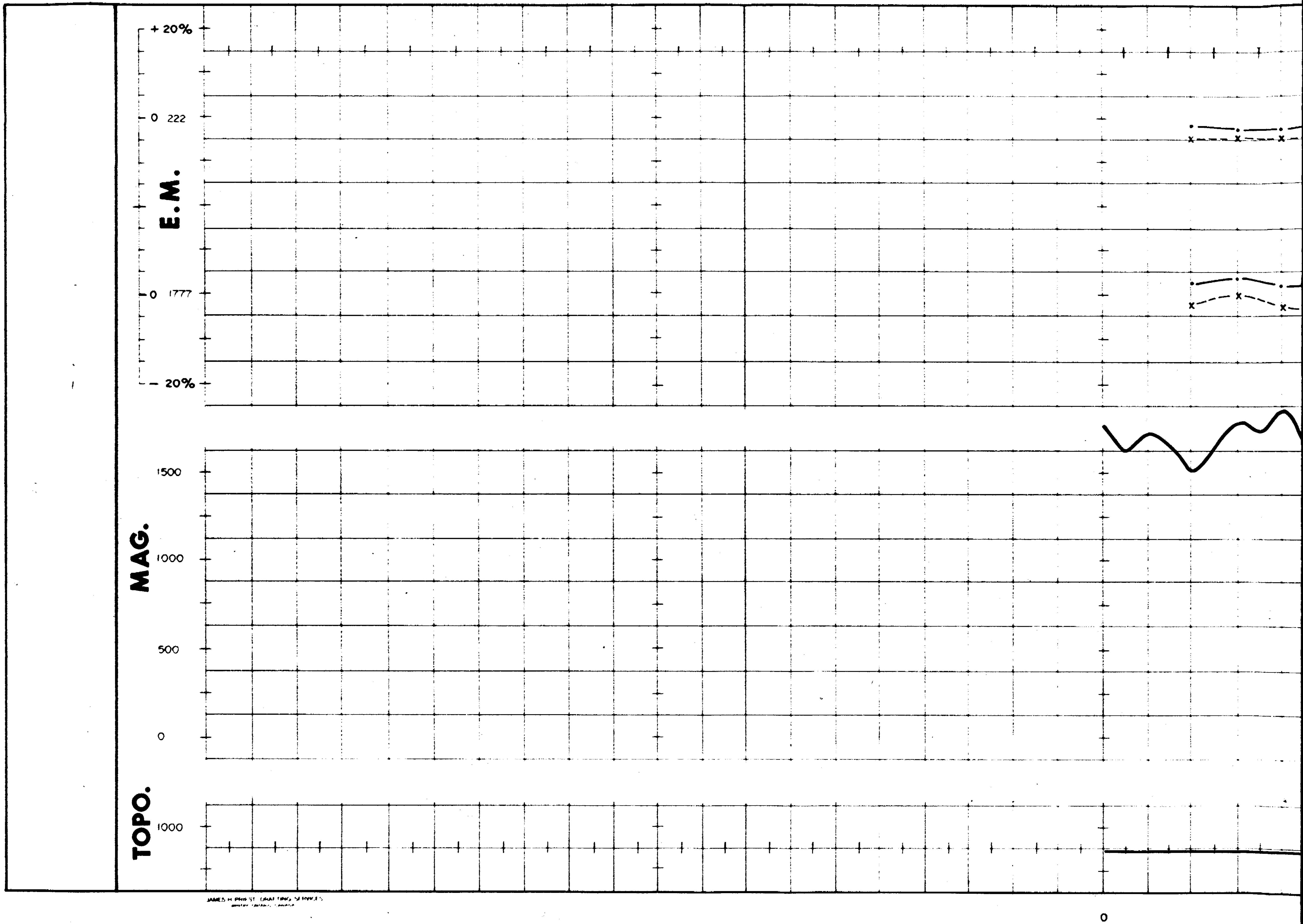
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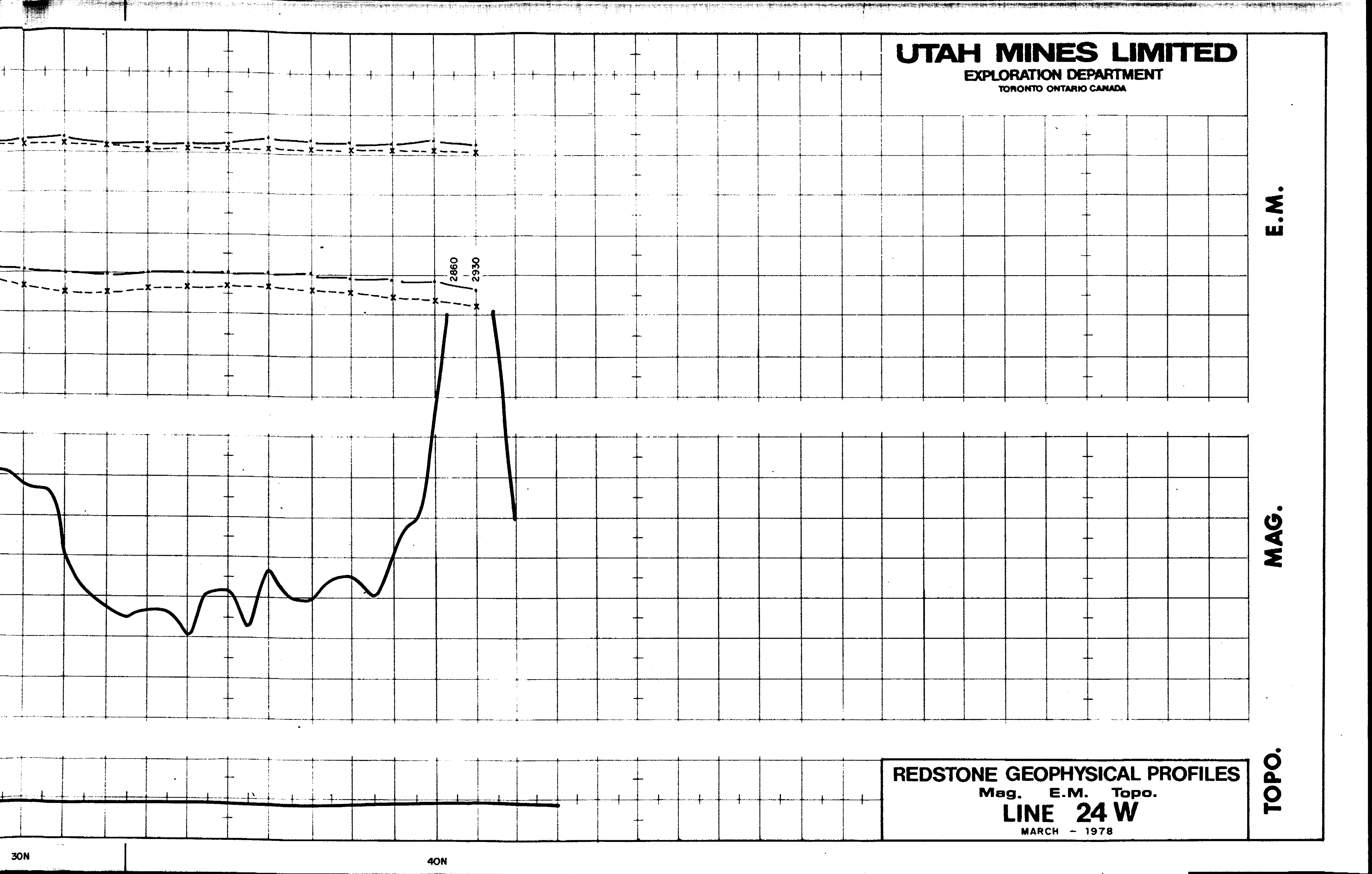
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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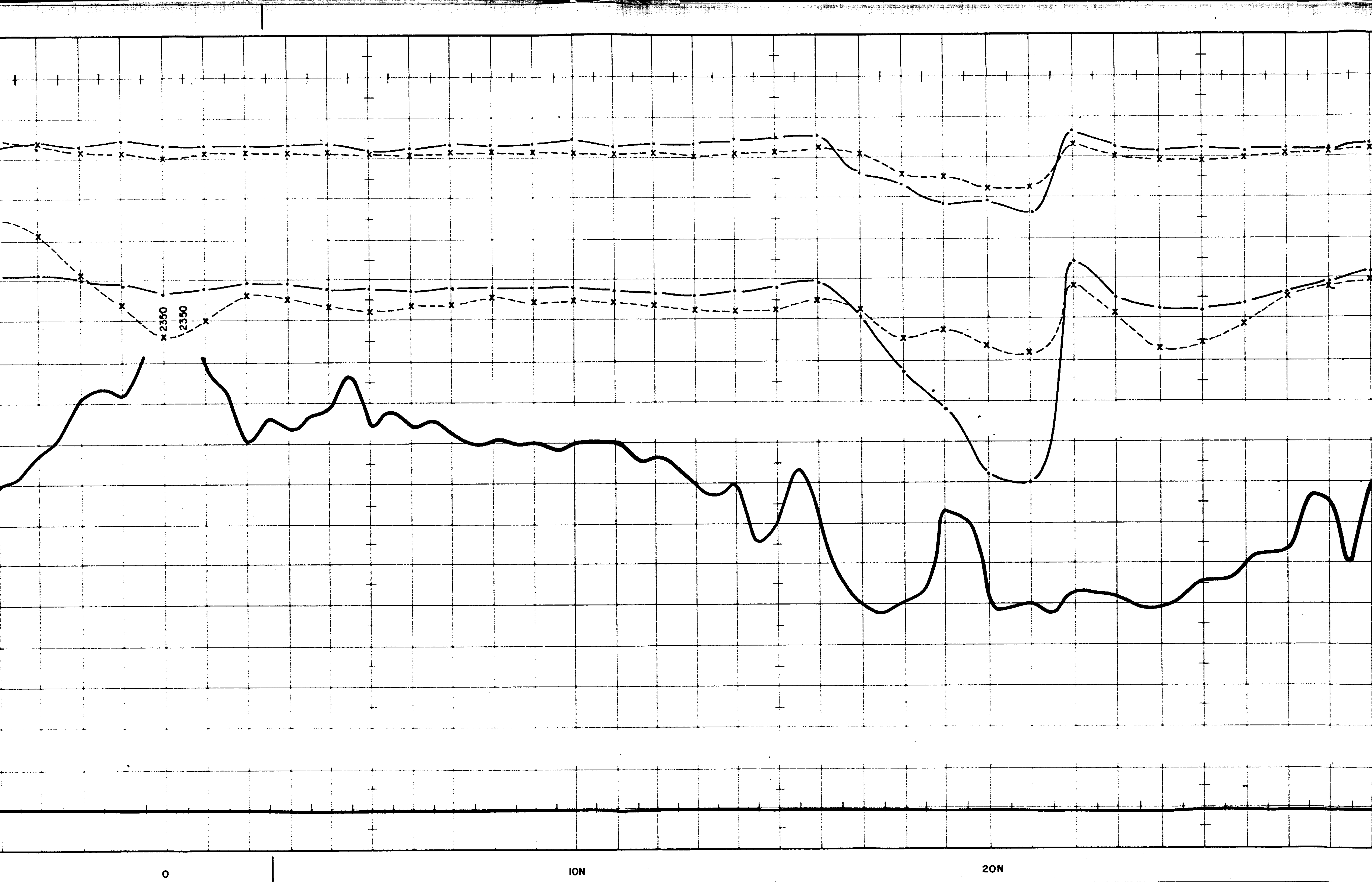

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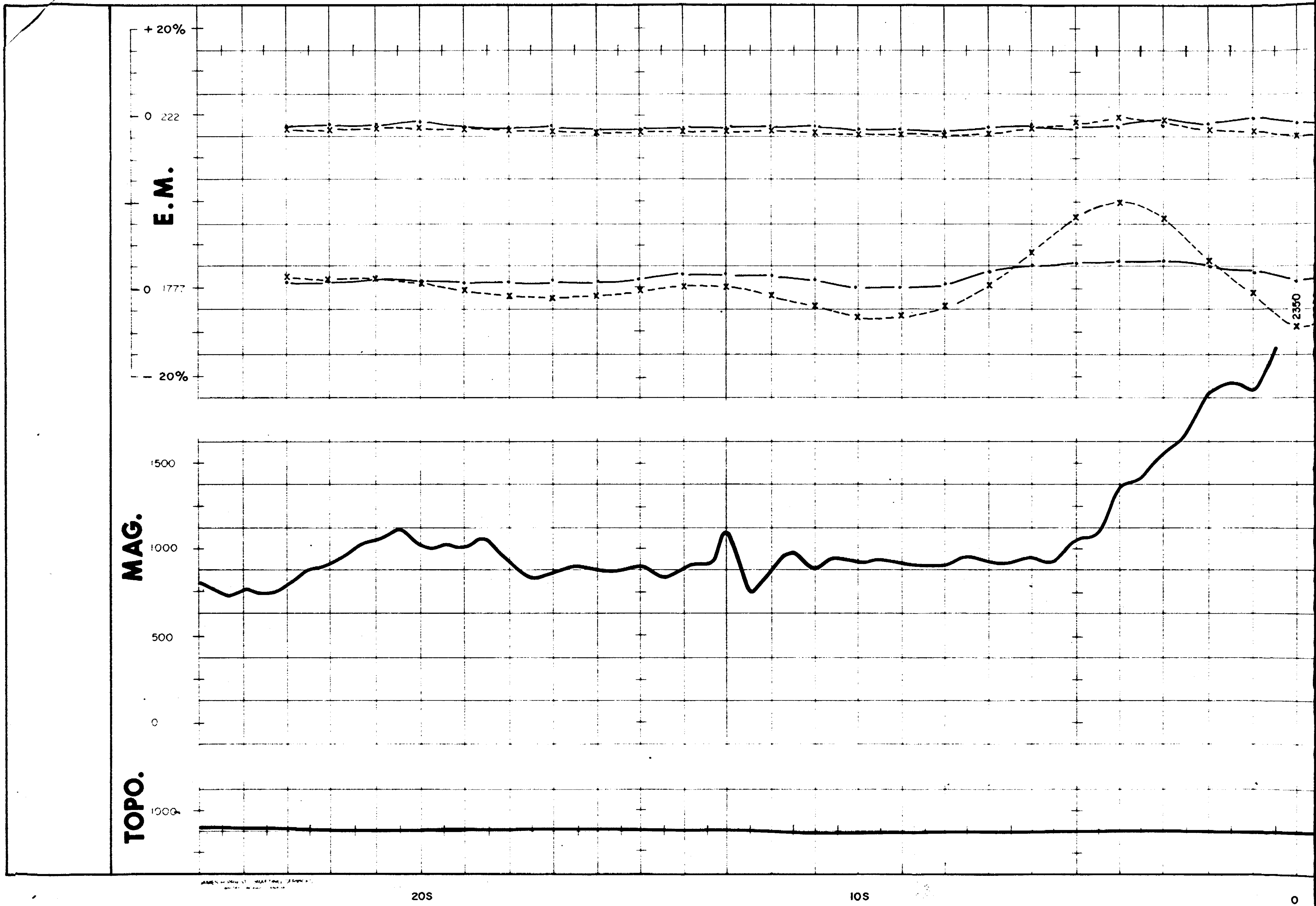

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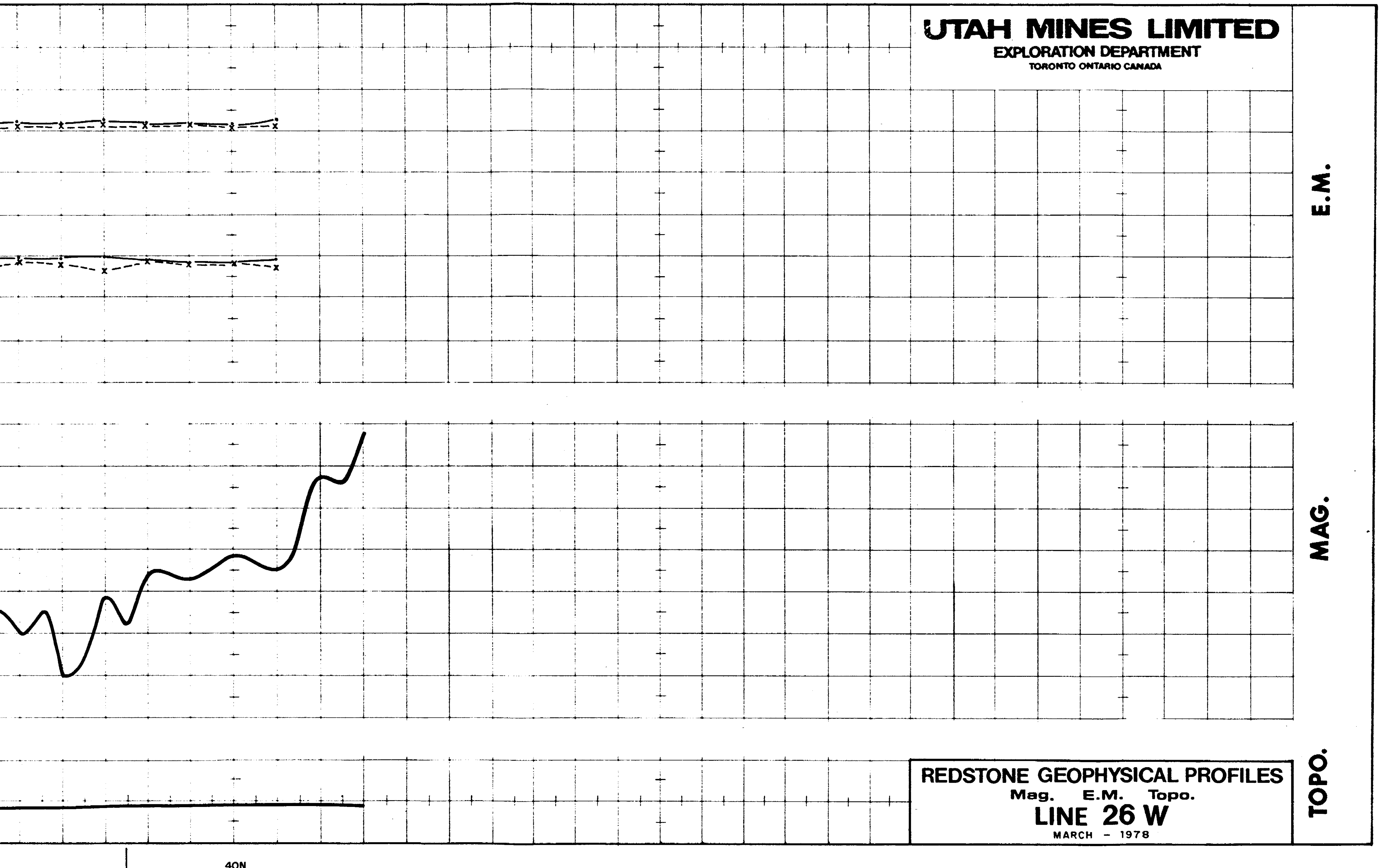

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
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Mag. E.M. Topo.
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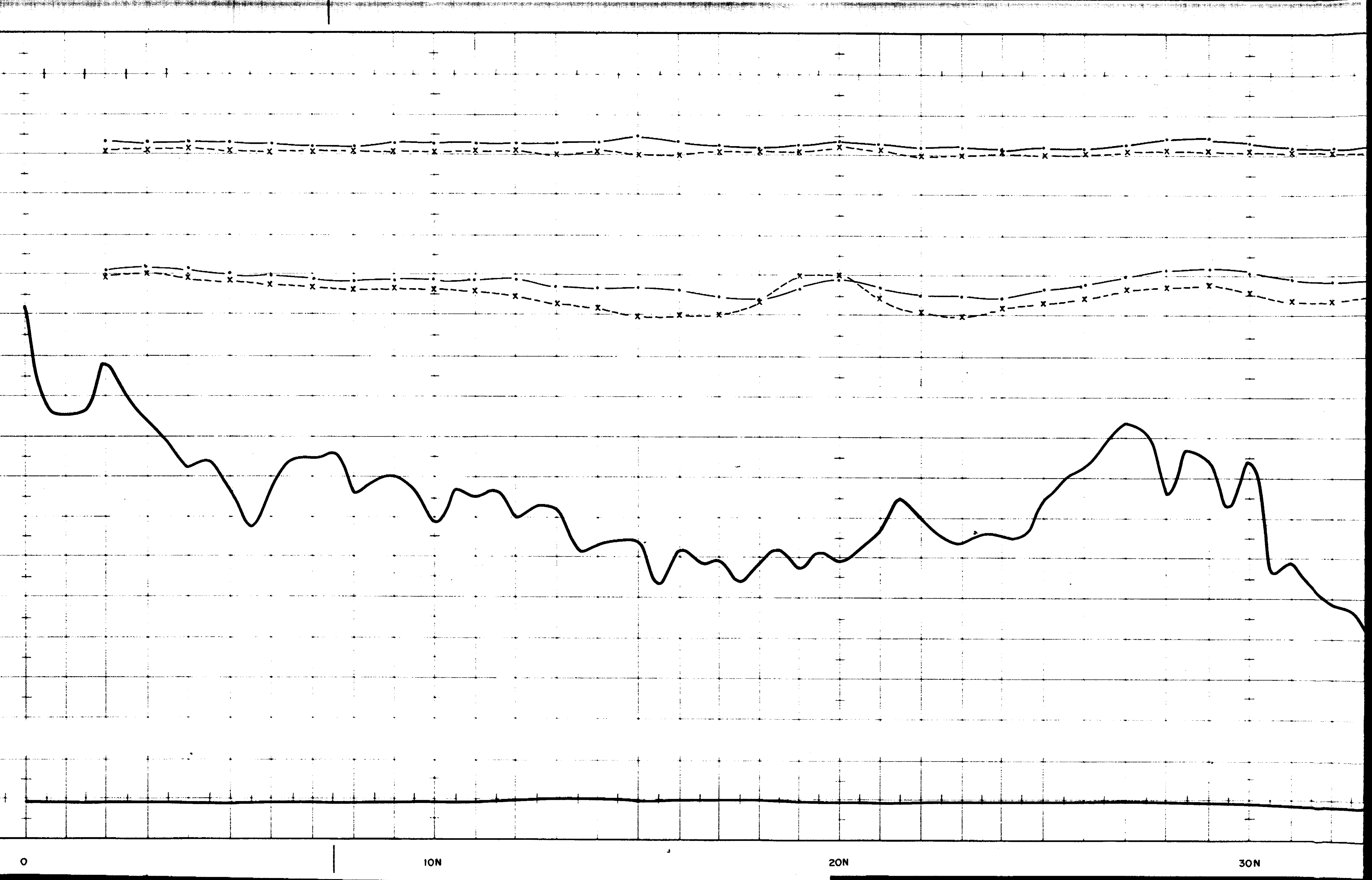

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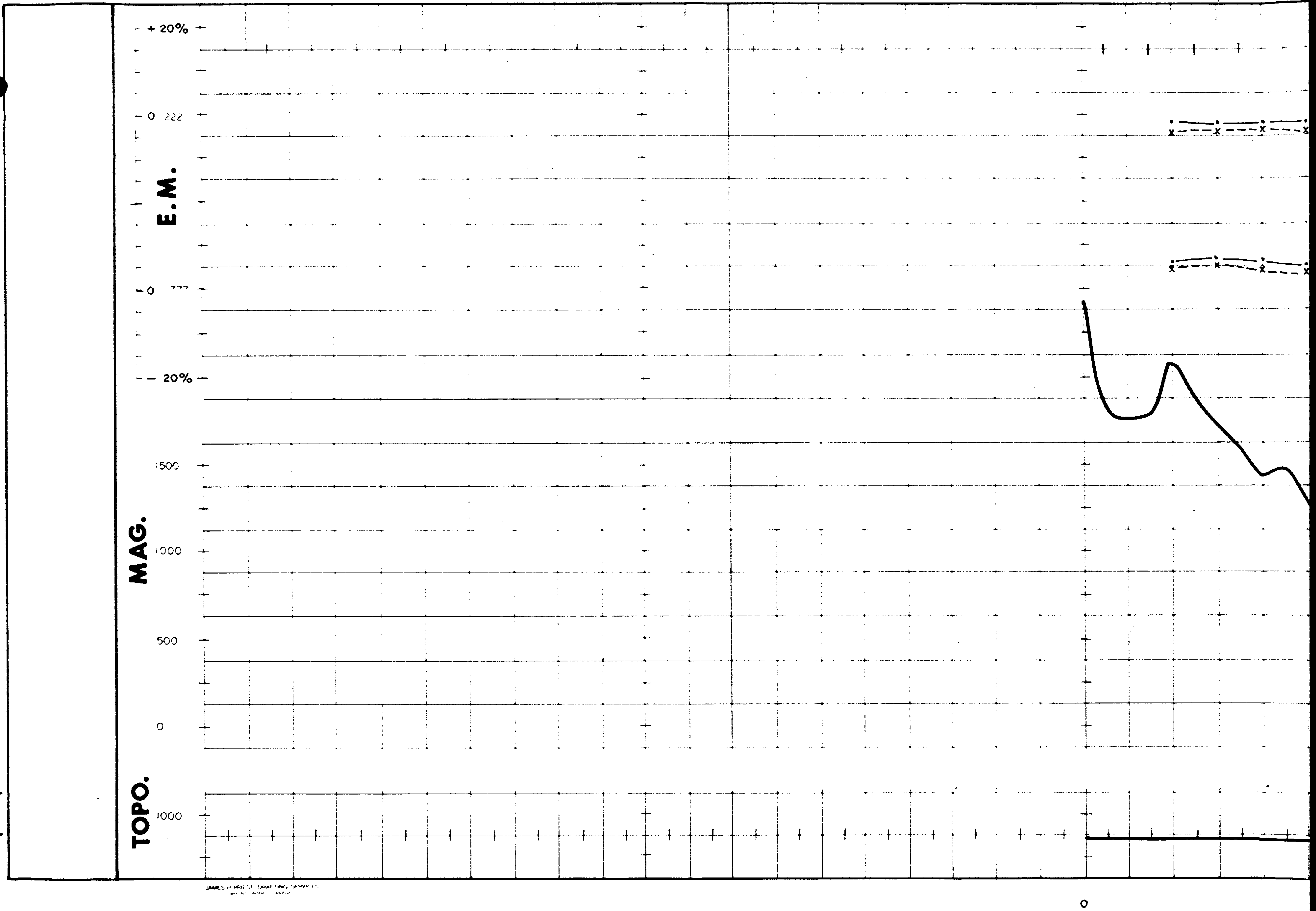

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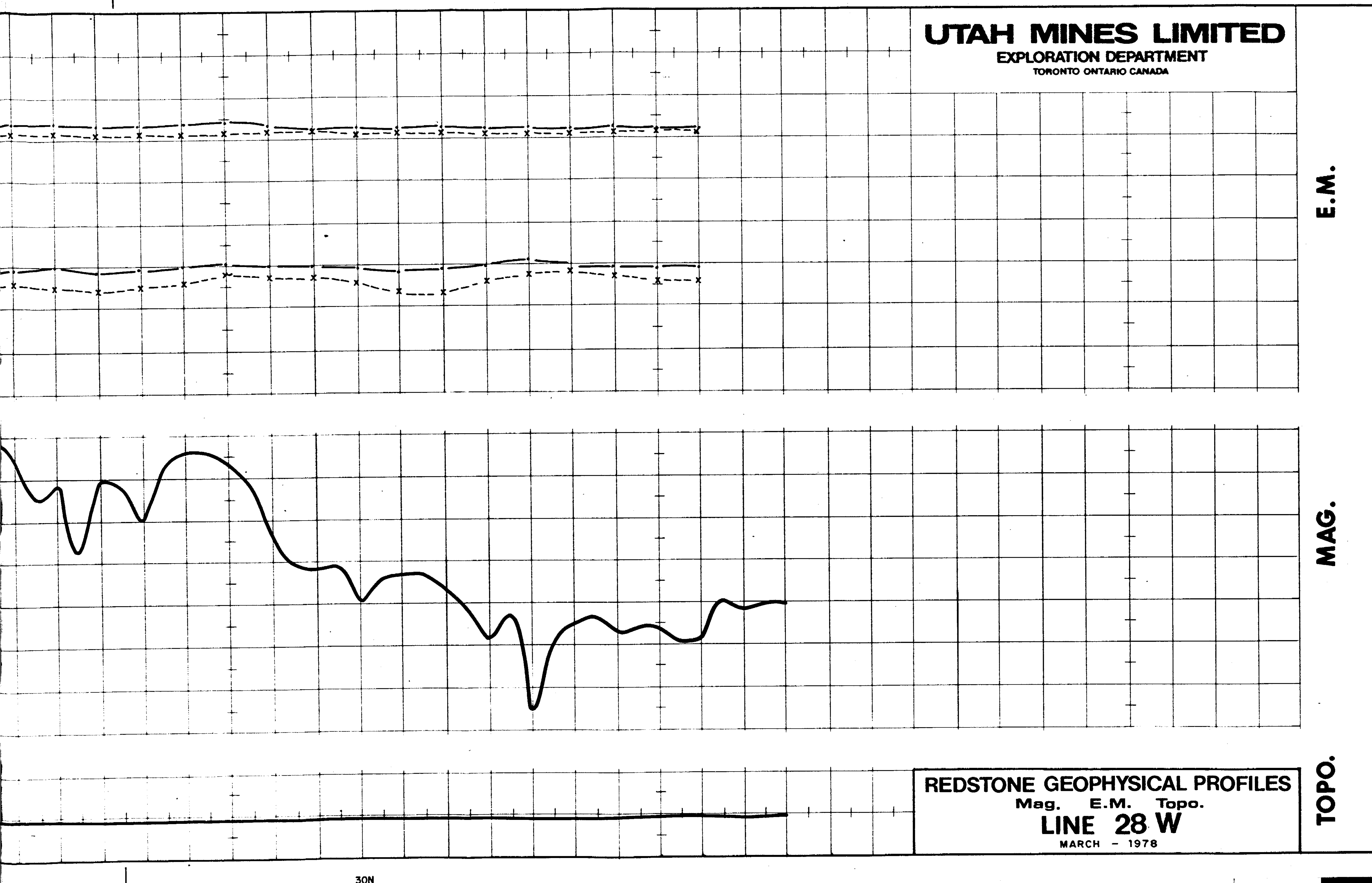
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
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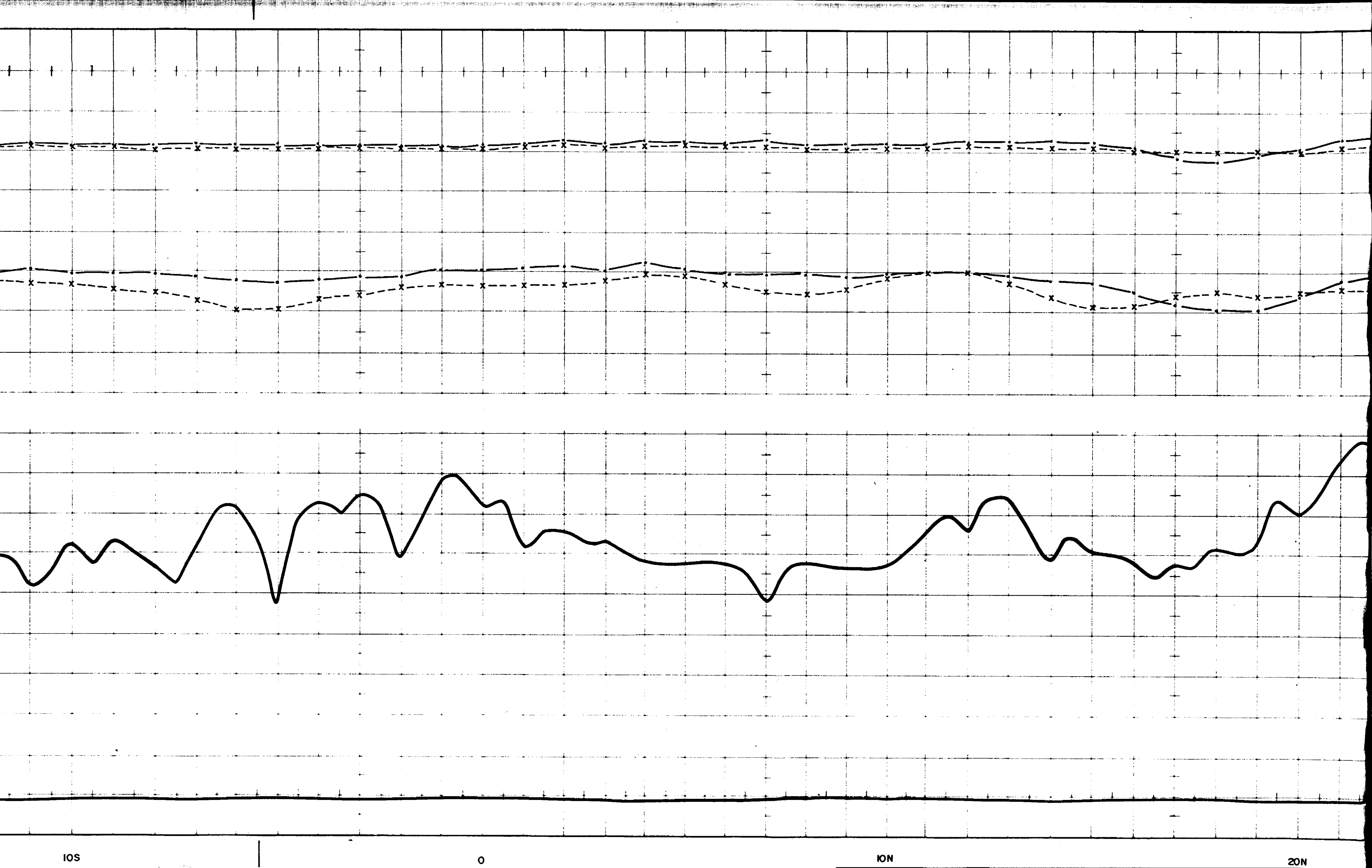

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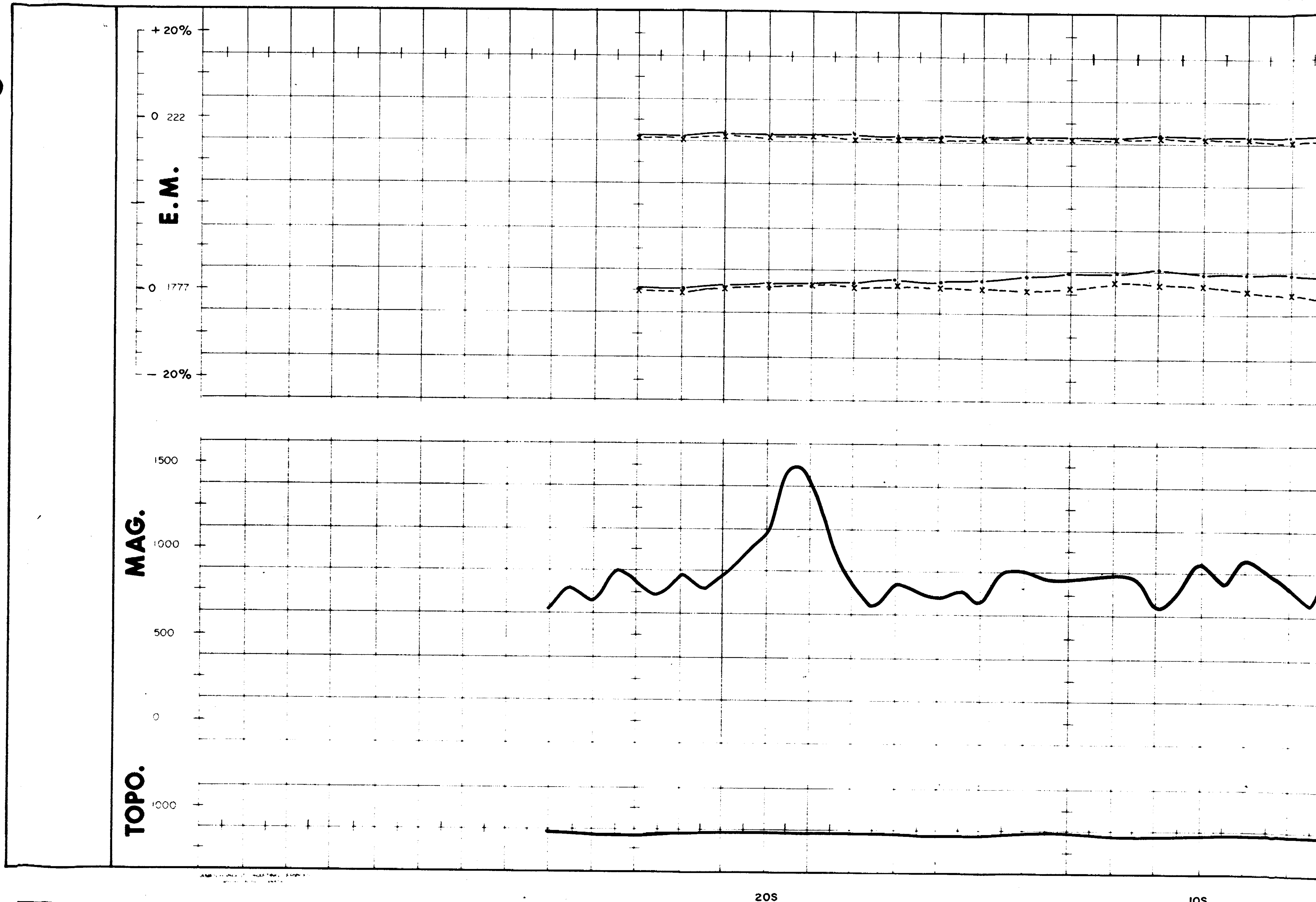
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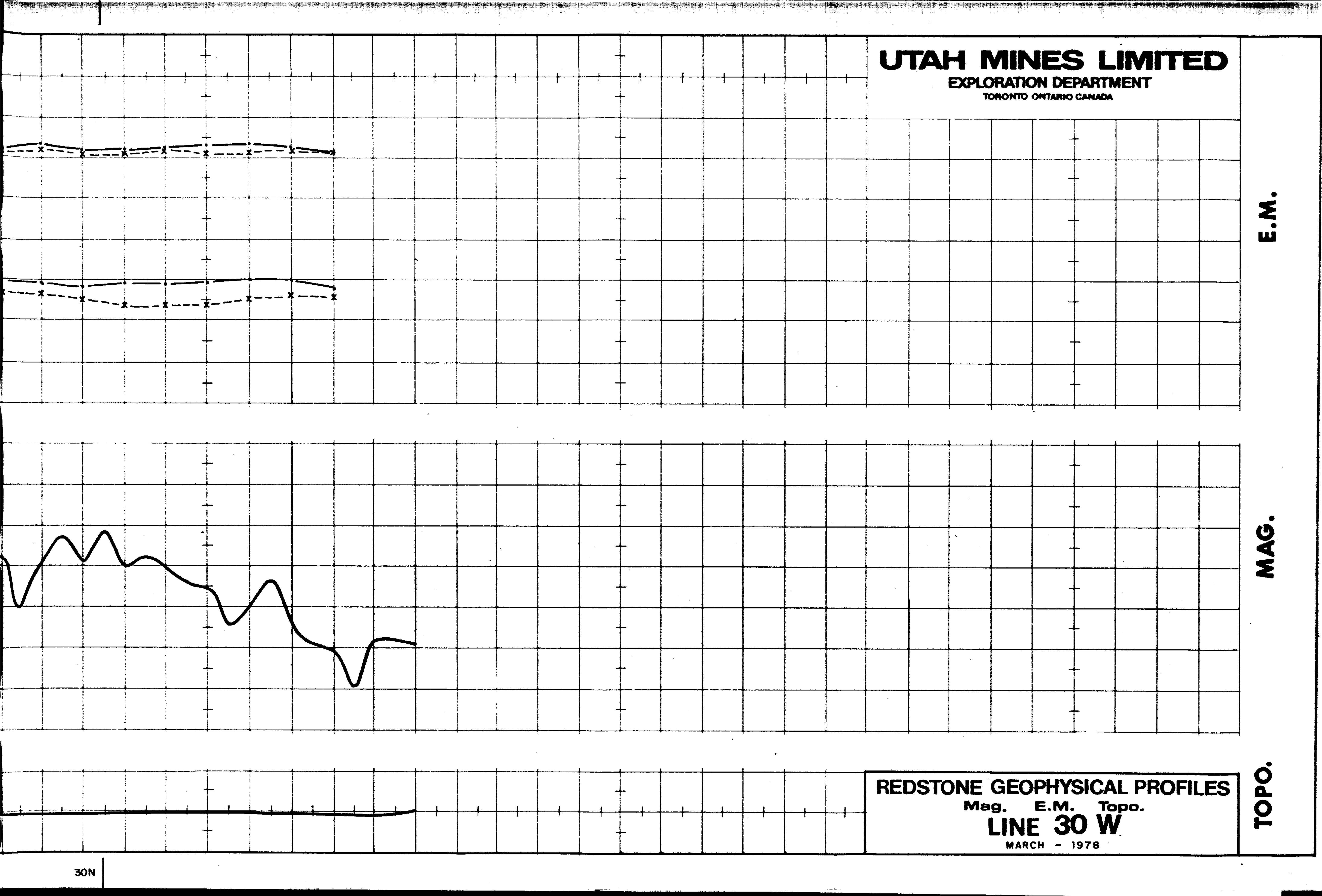
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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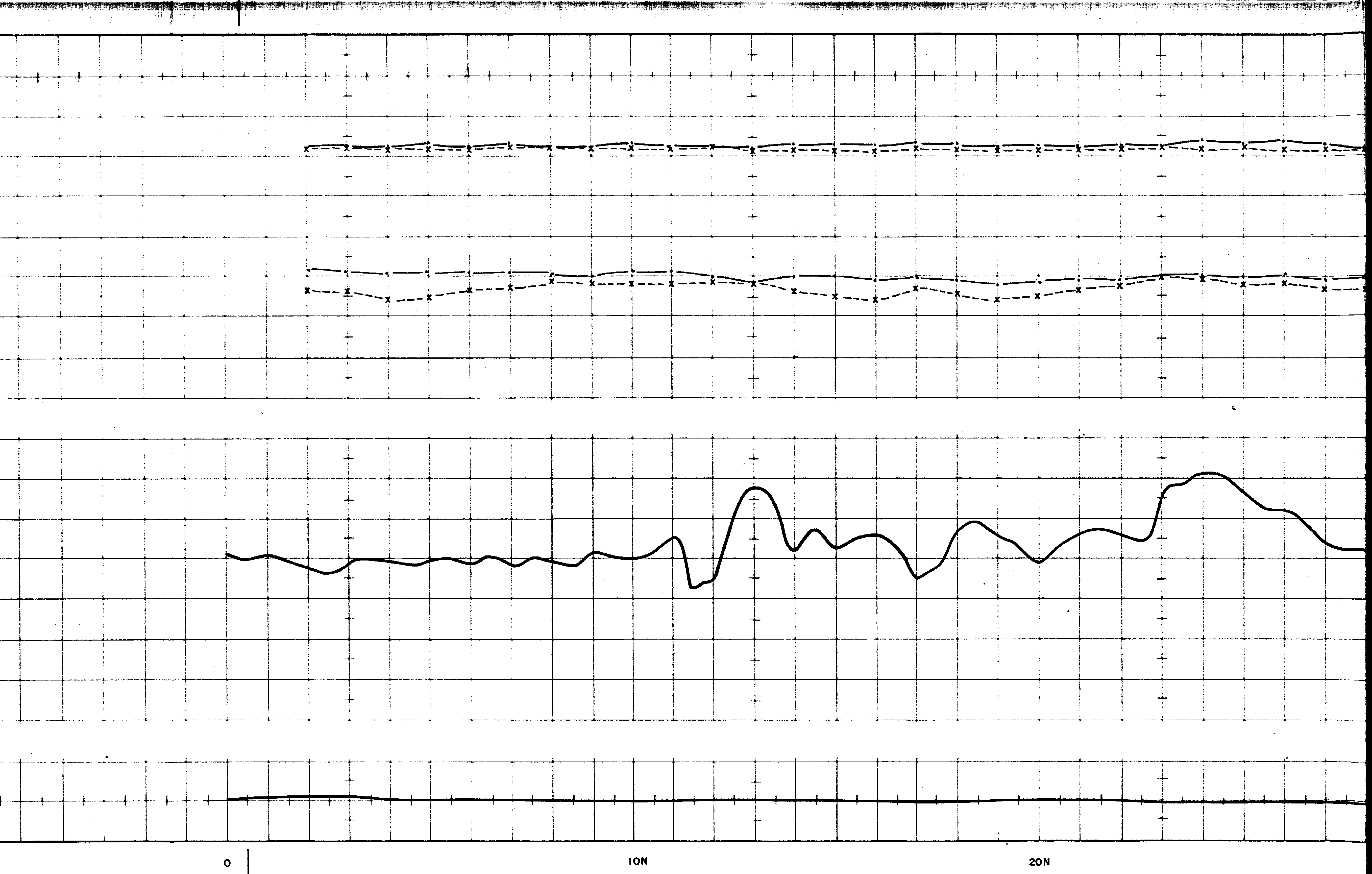
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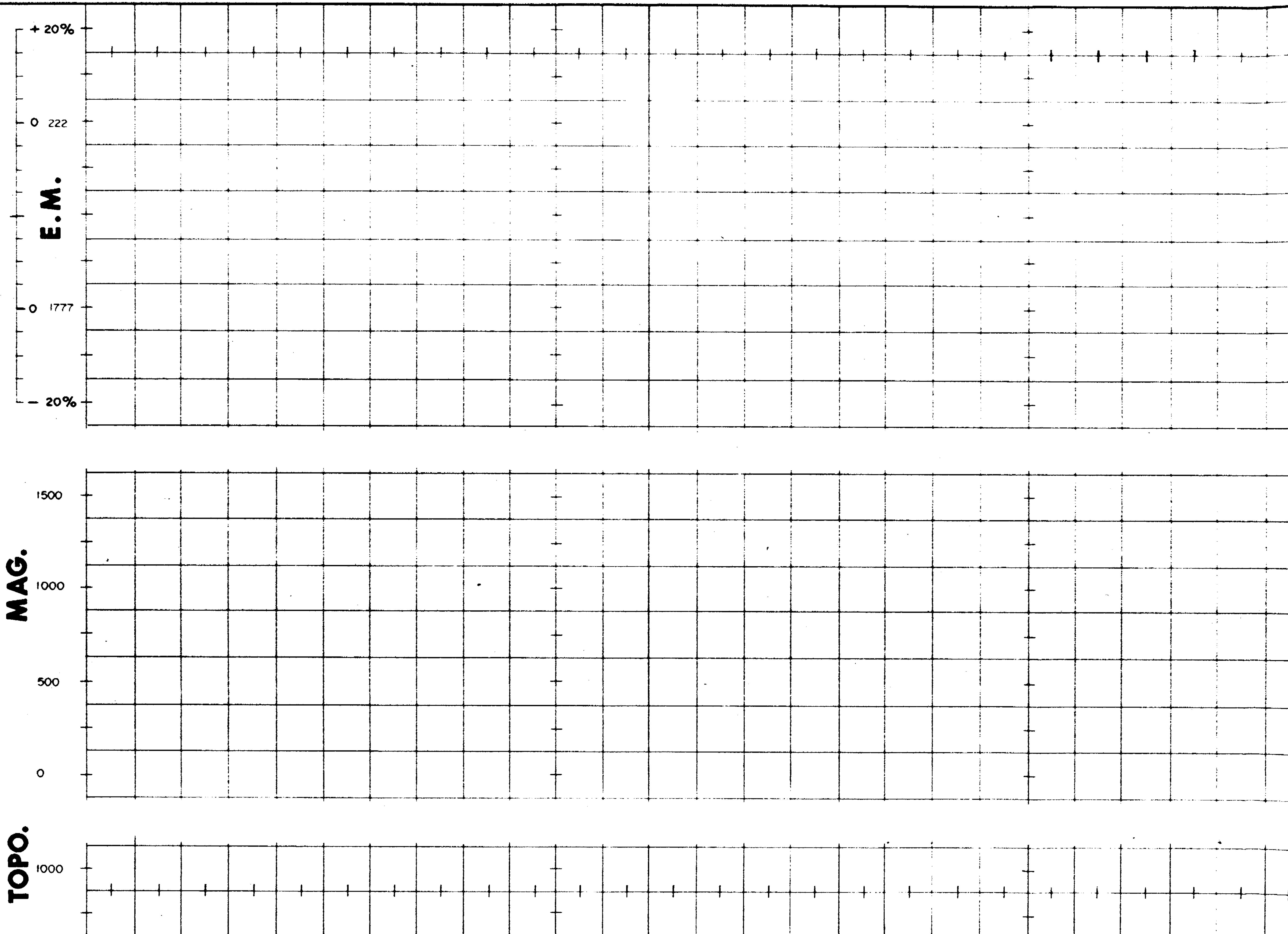
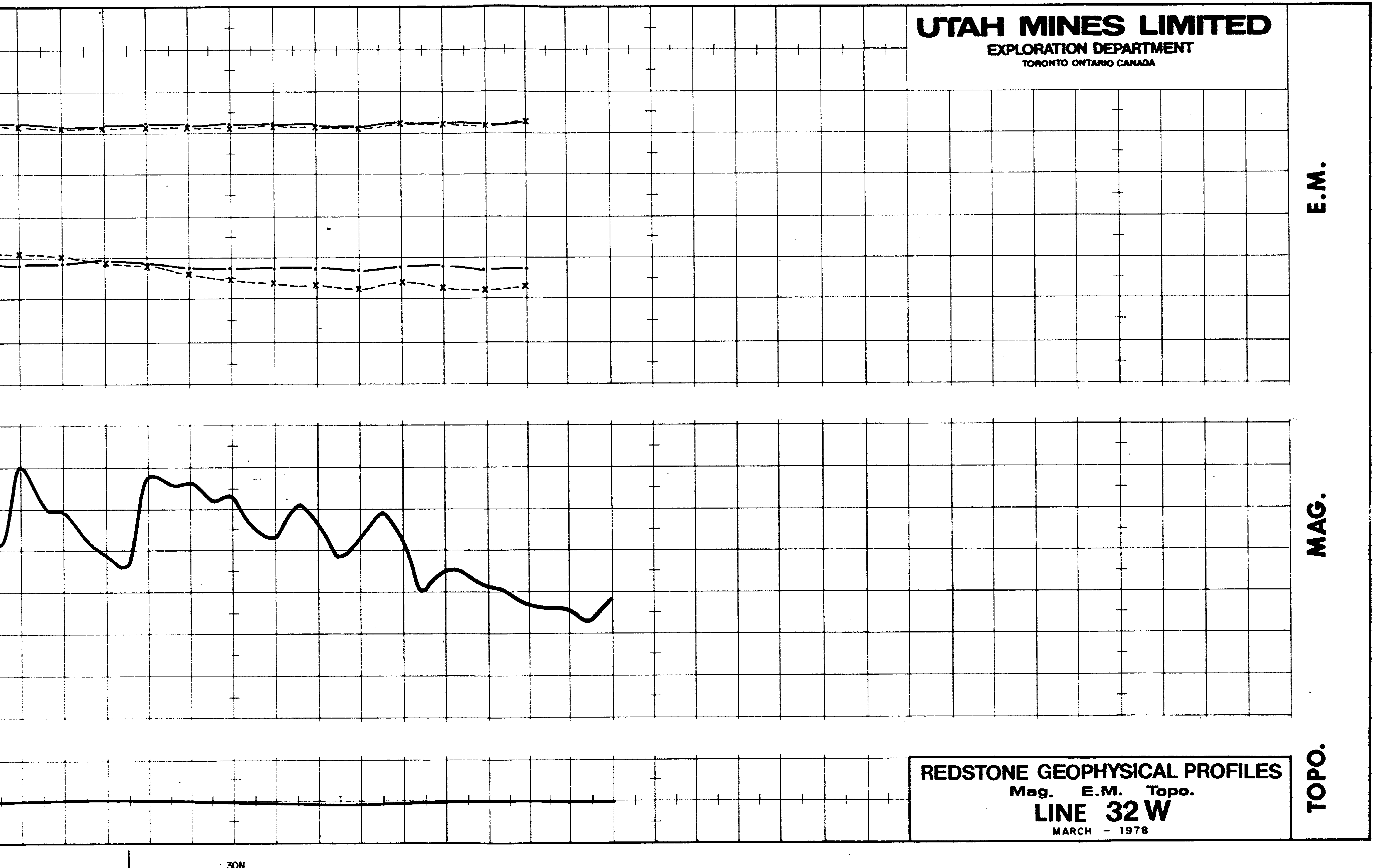


JAMES H PRIEST DRAFTING SERVICES


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
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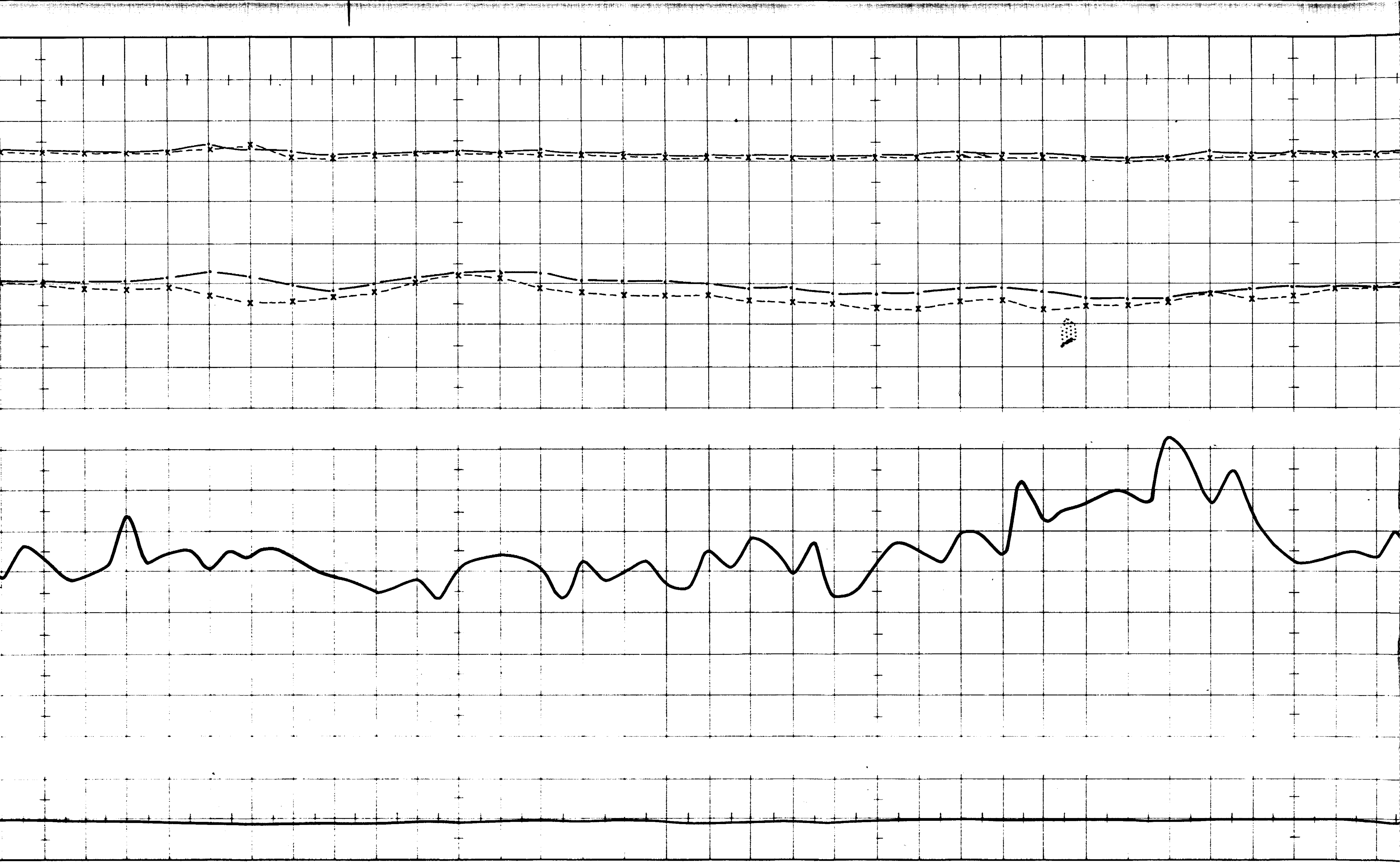

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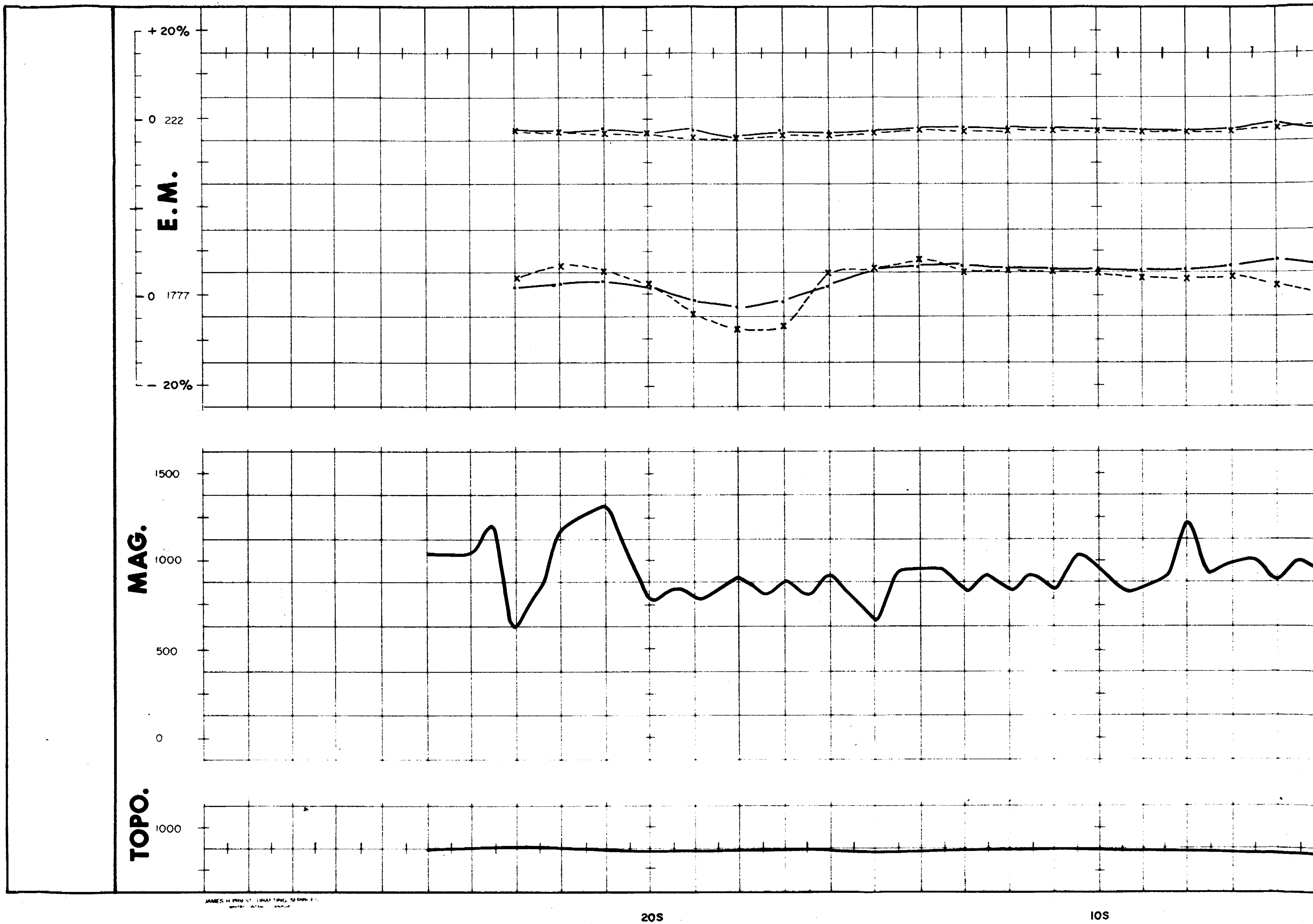

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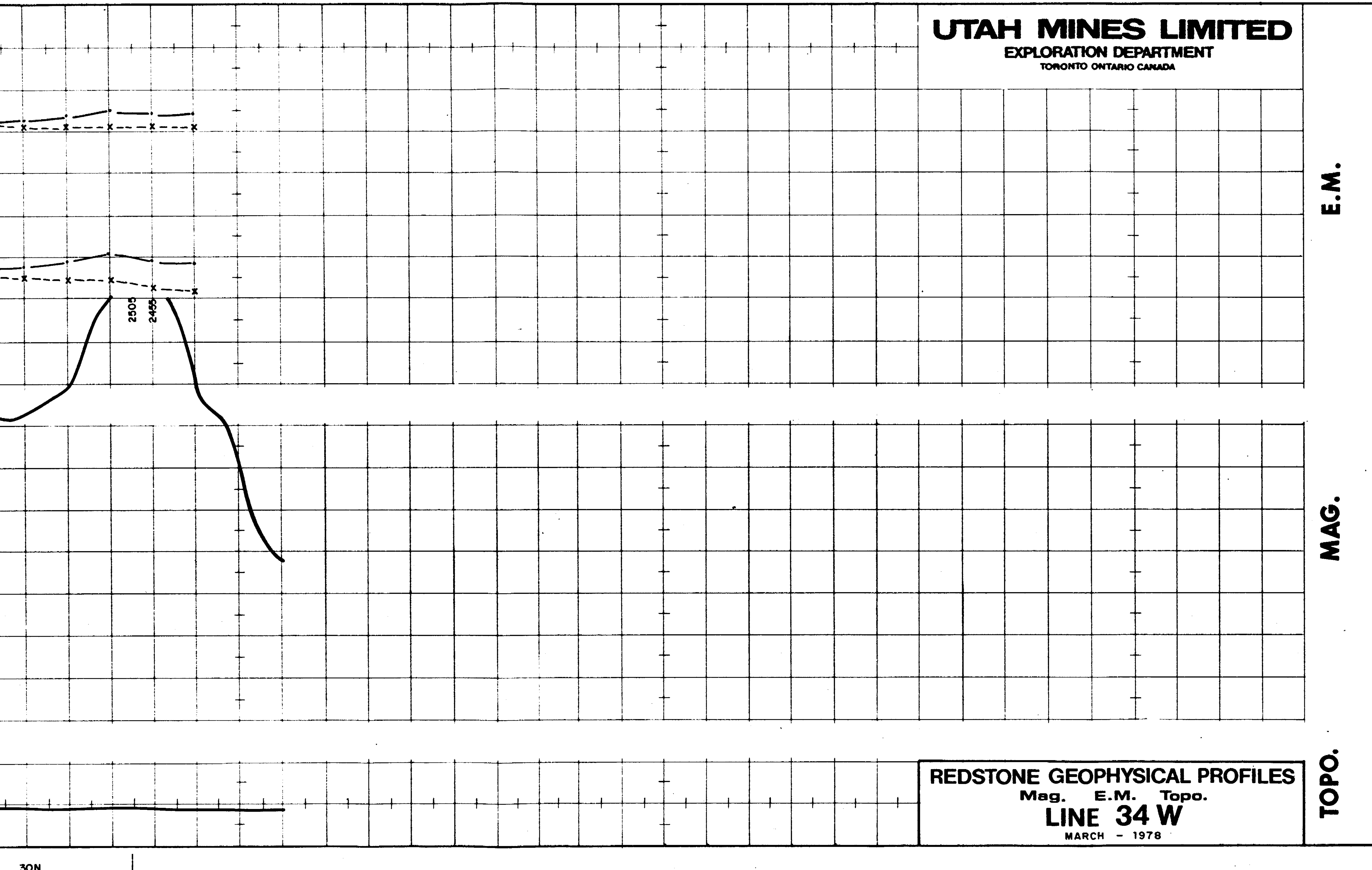
UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA

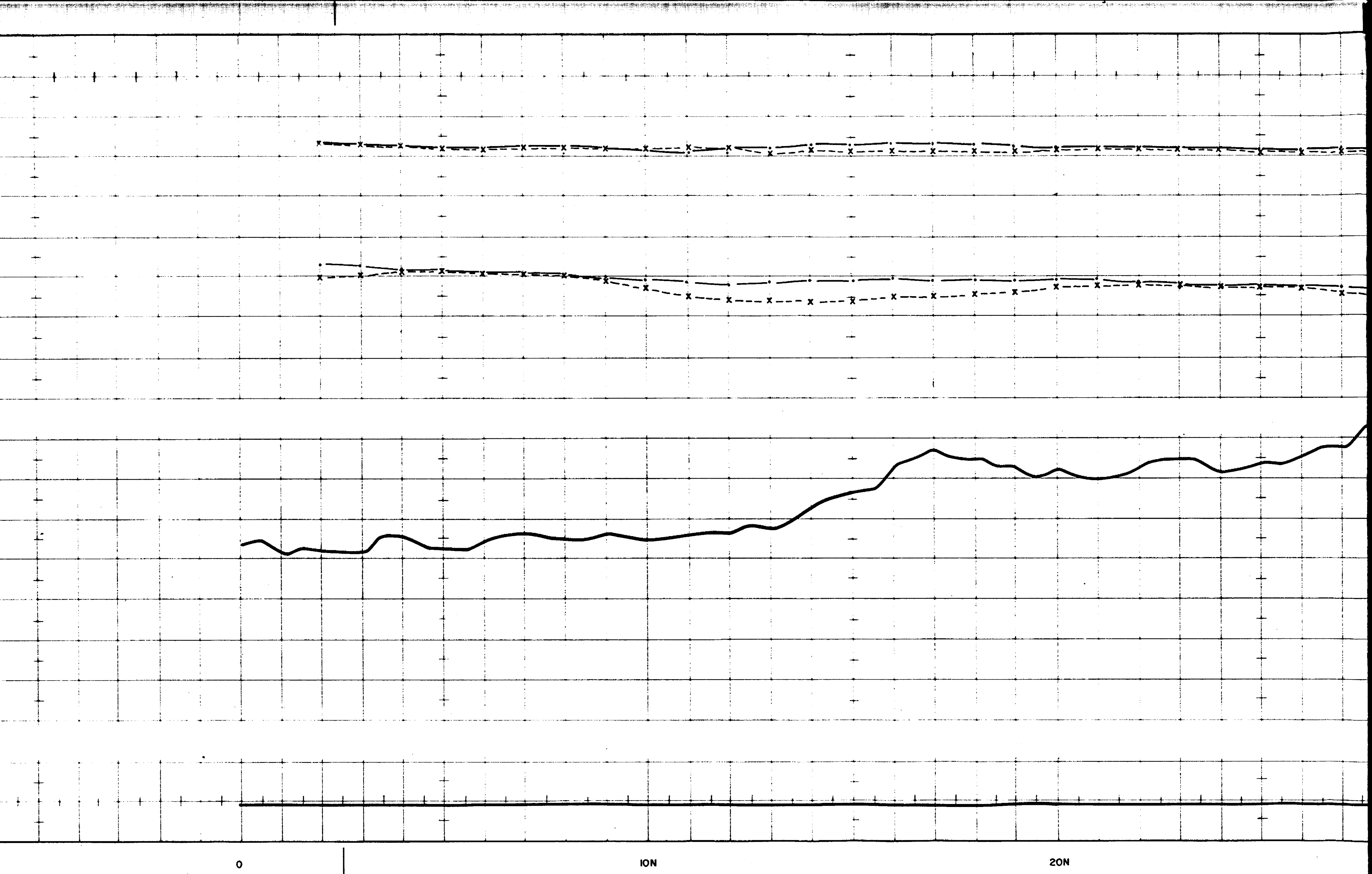


REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

LINE 34 W

MARCH - 1978



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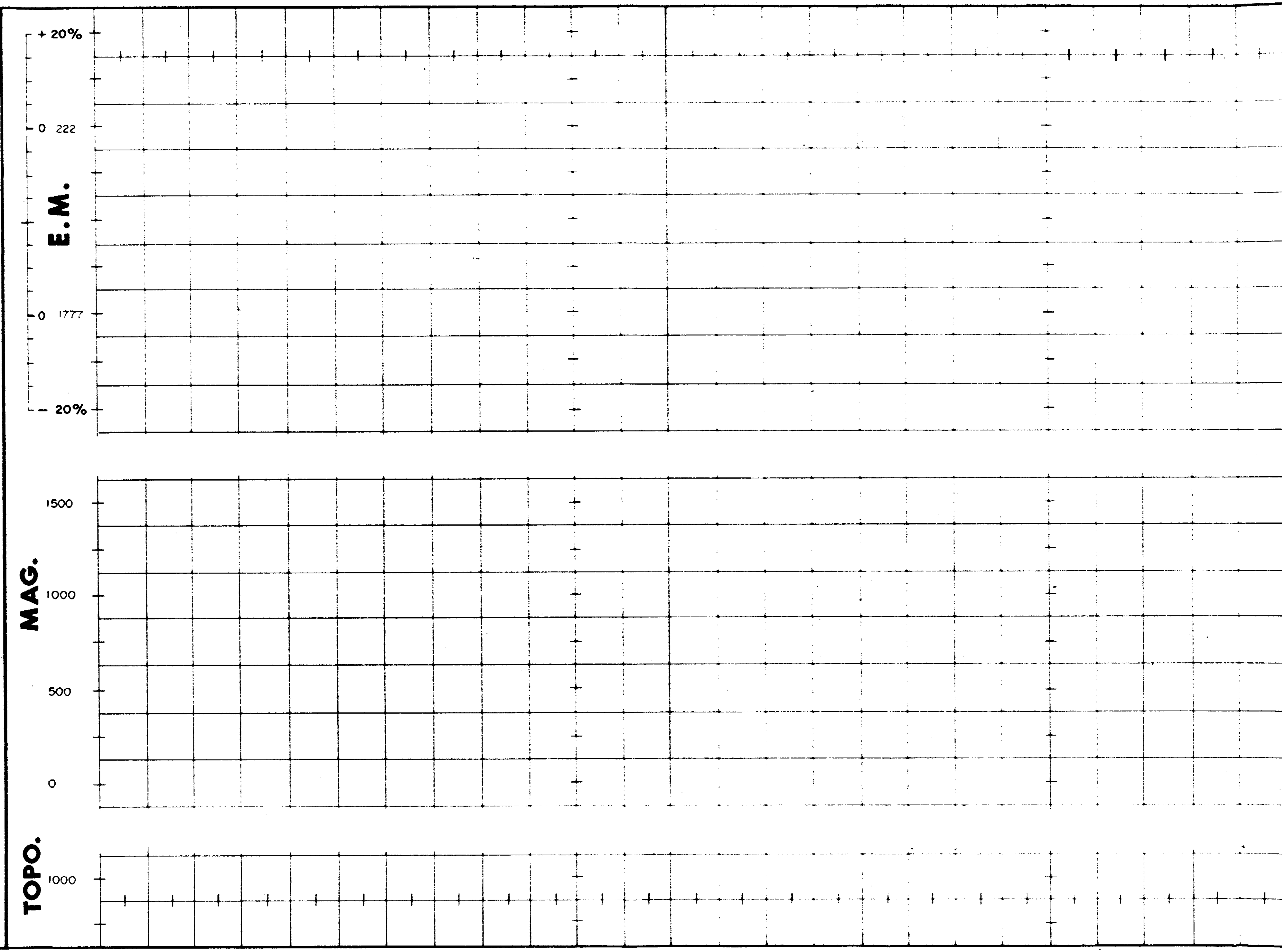

JAMES H PRIEST DRAFTING SERVICES
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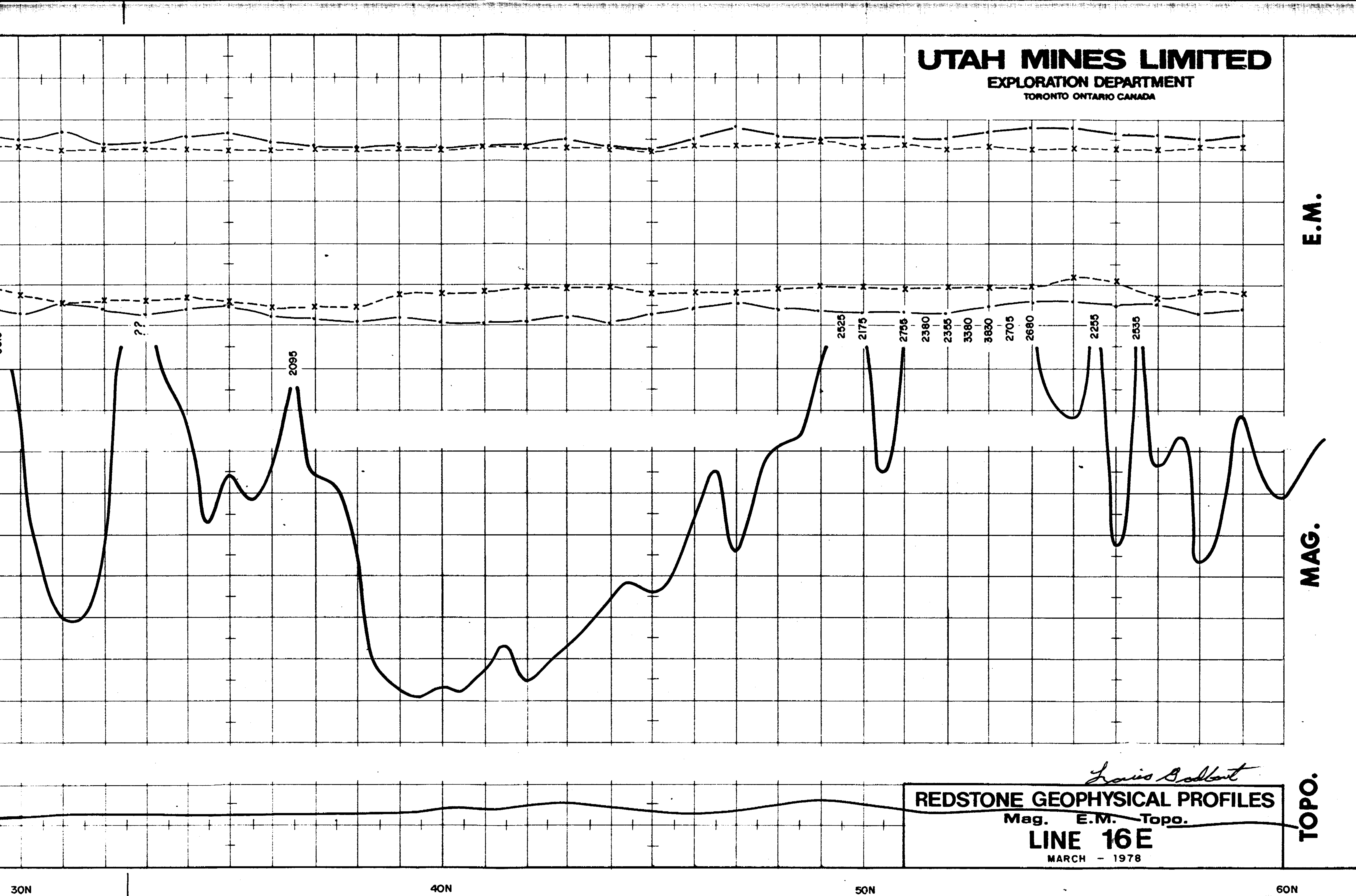
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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MAG.
TOPO.
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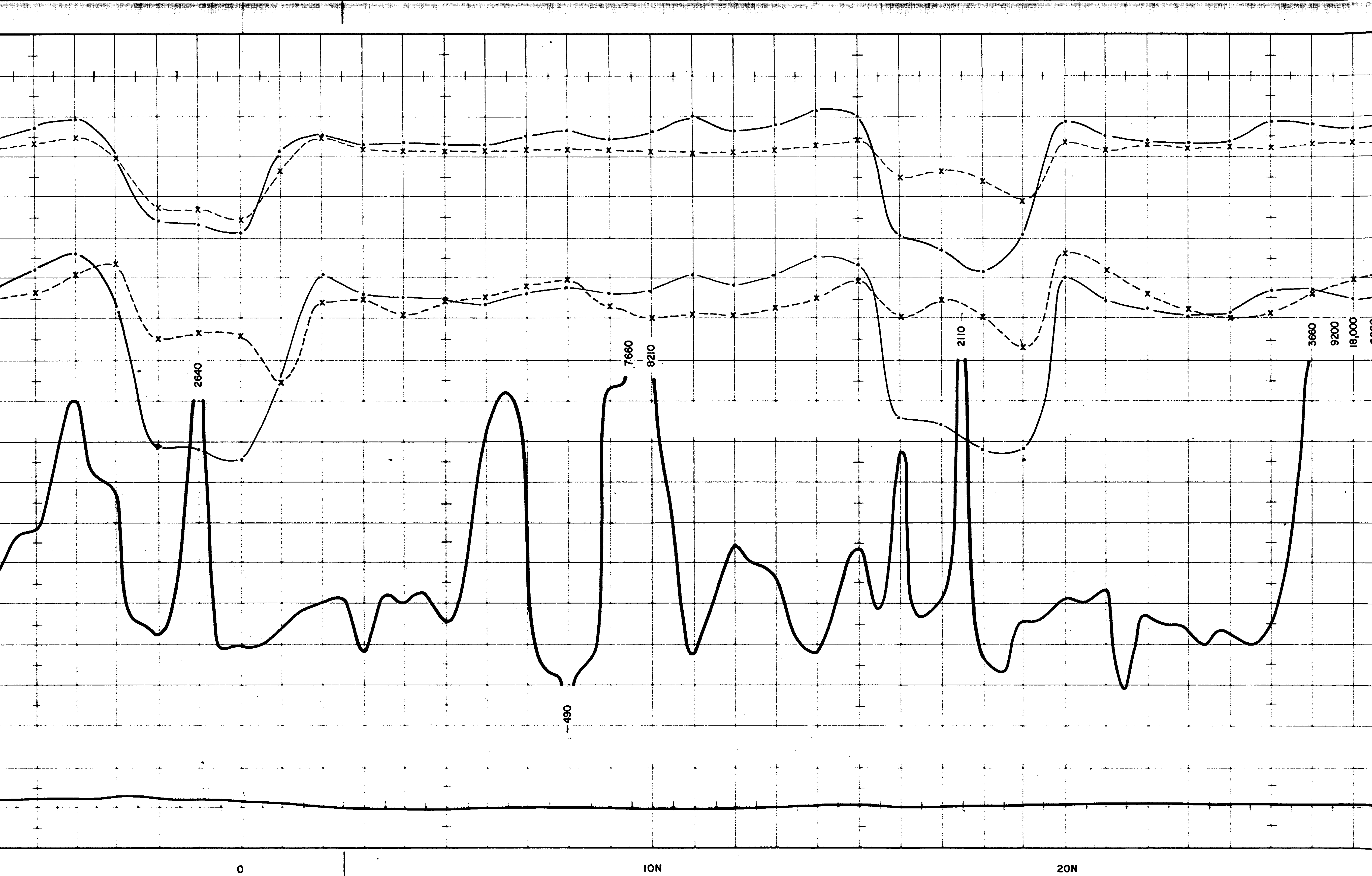
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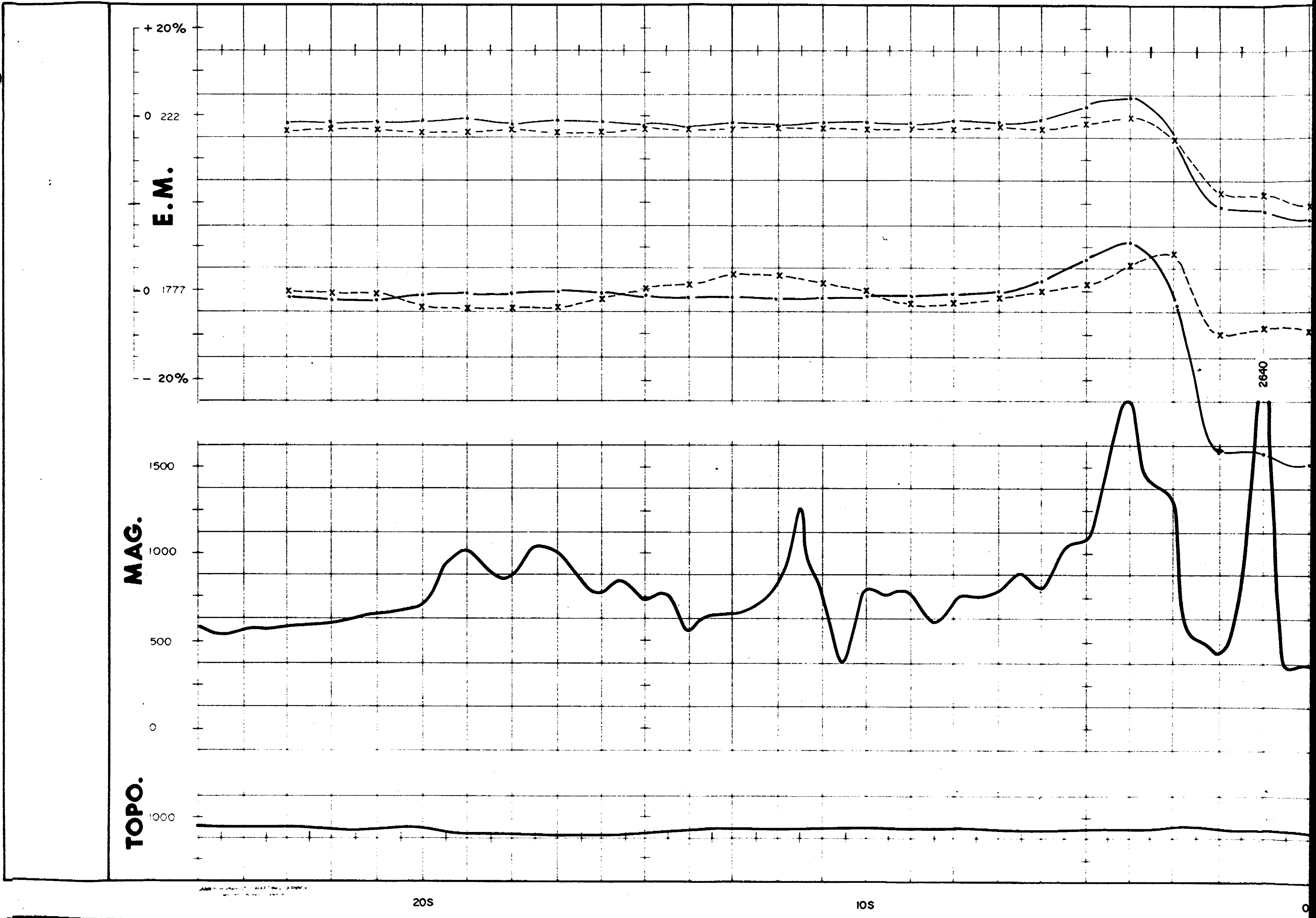
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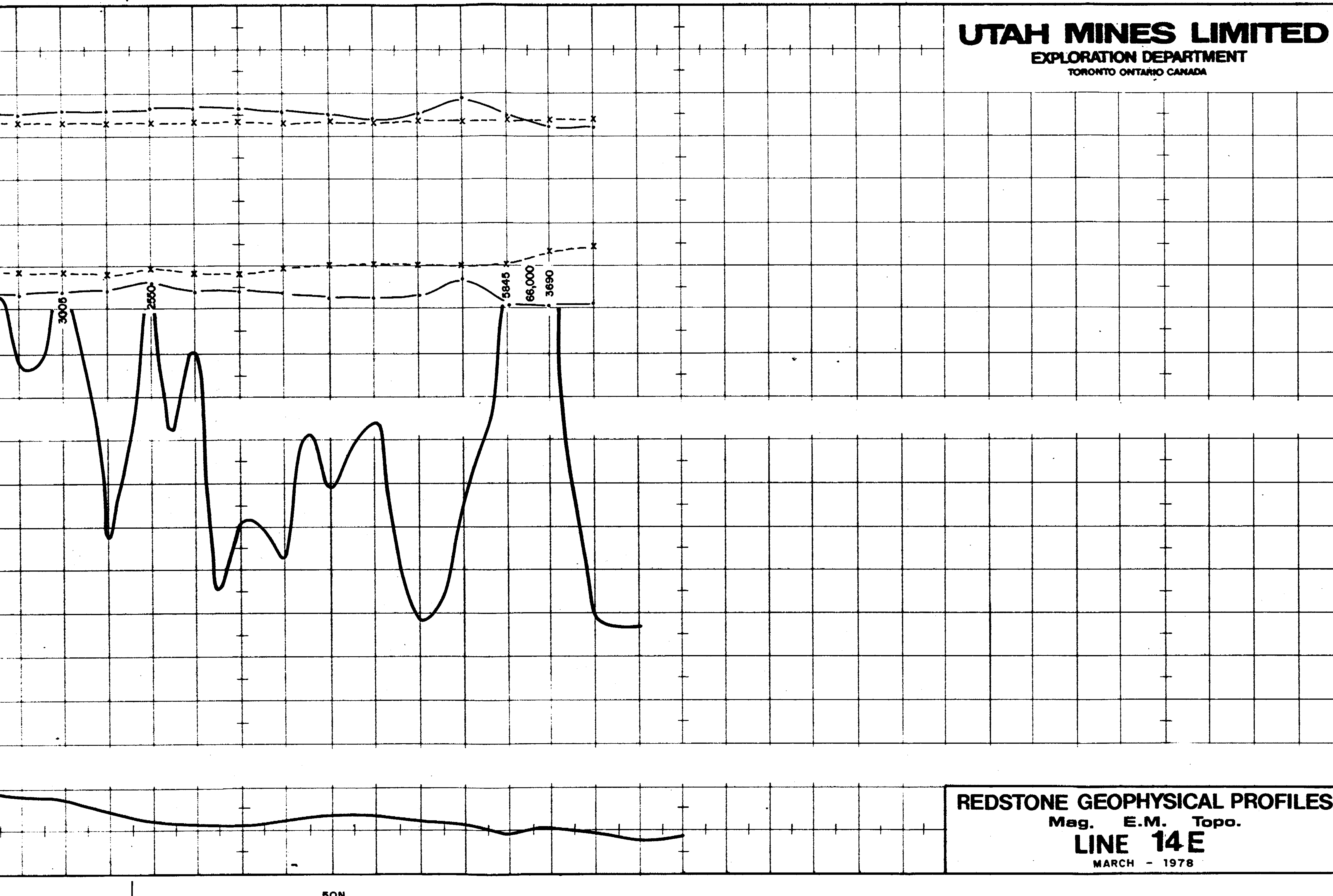
UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA



E.M.

MAG.

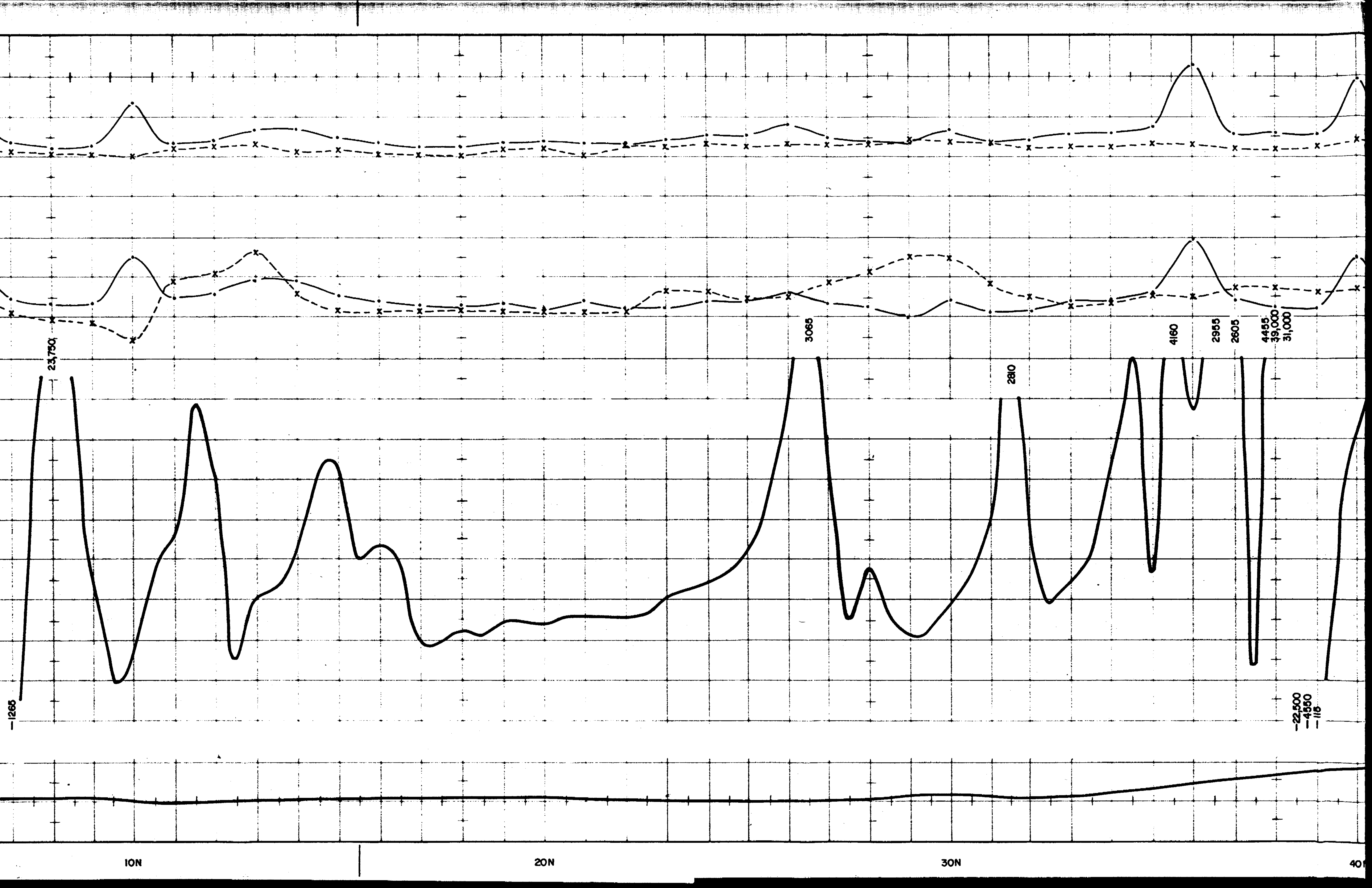
TOPO.

REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

LINE 14 E

MARCH - 1978



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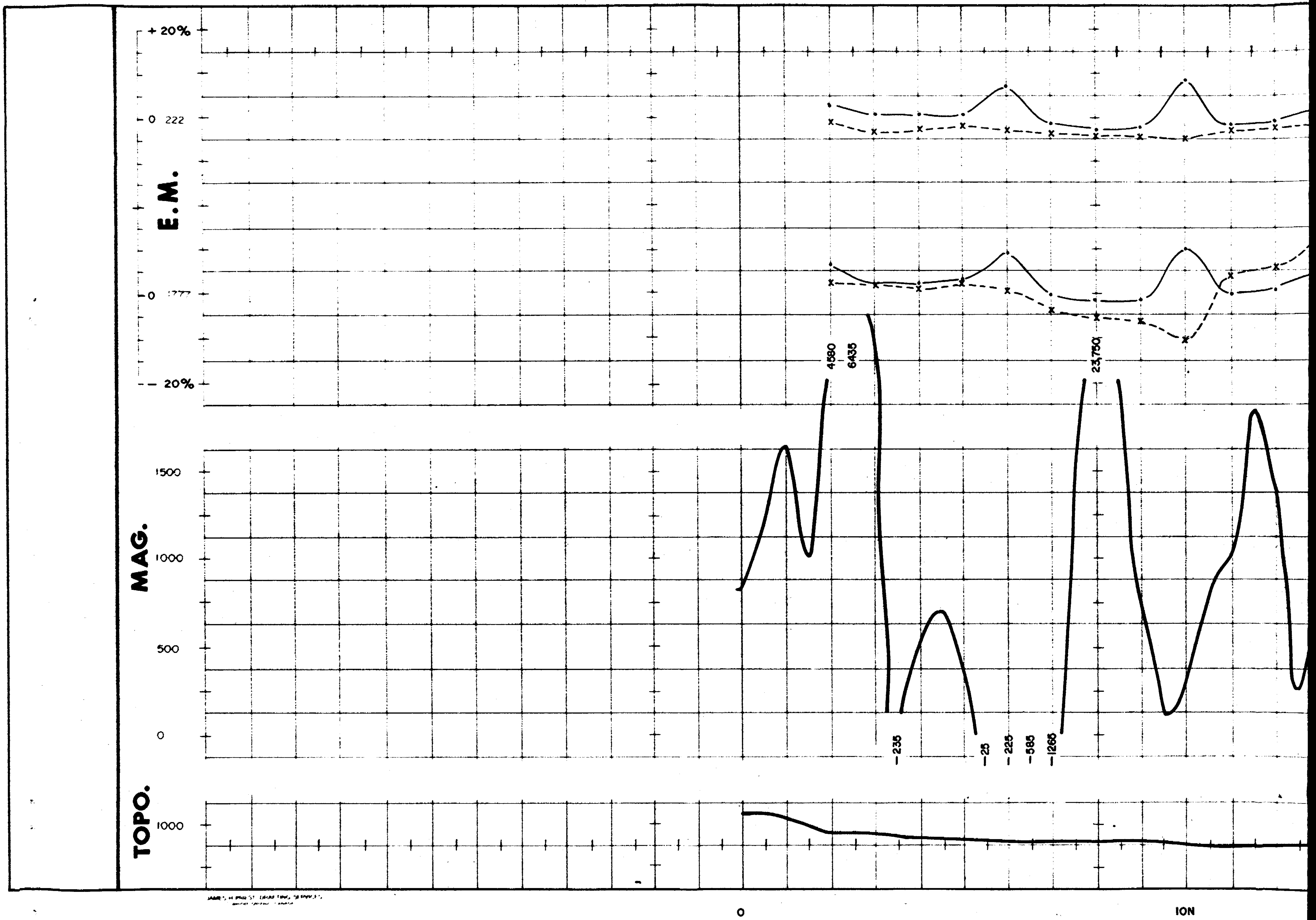

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E.M.
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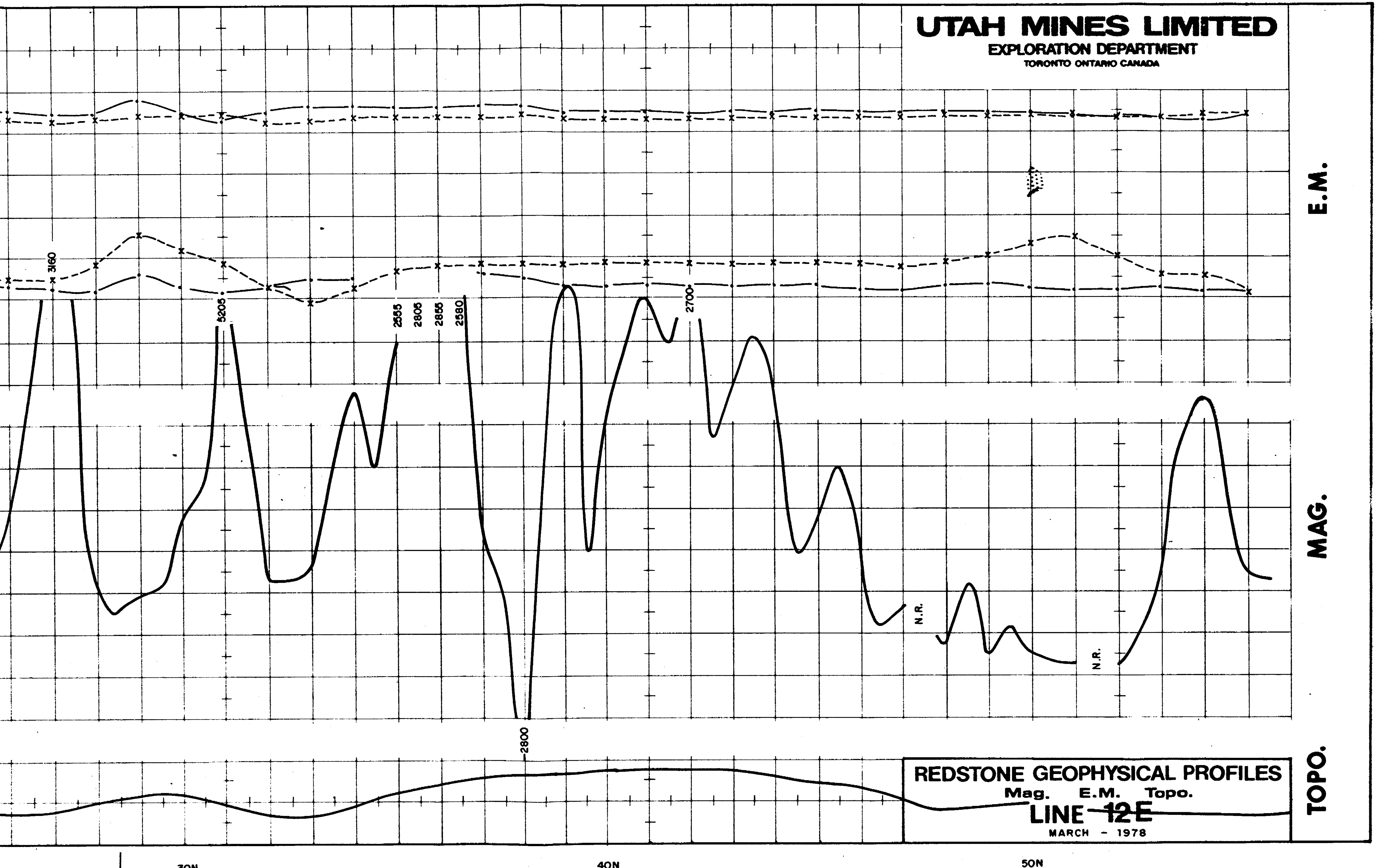
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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MAG.
TOPO.
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MARCH - 1978
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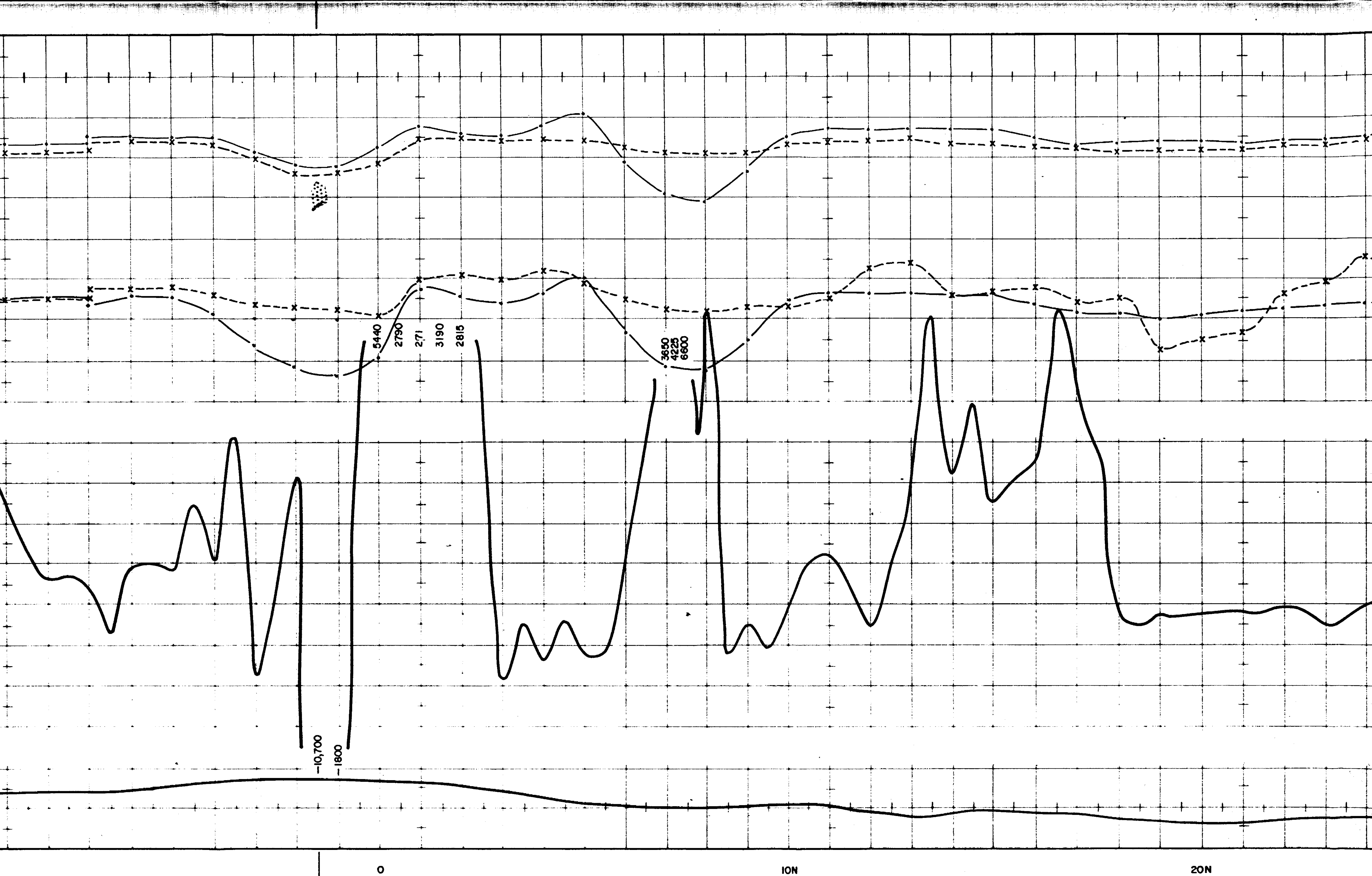

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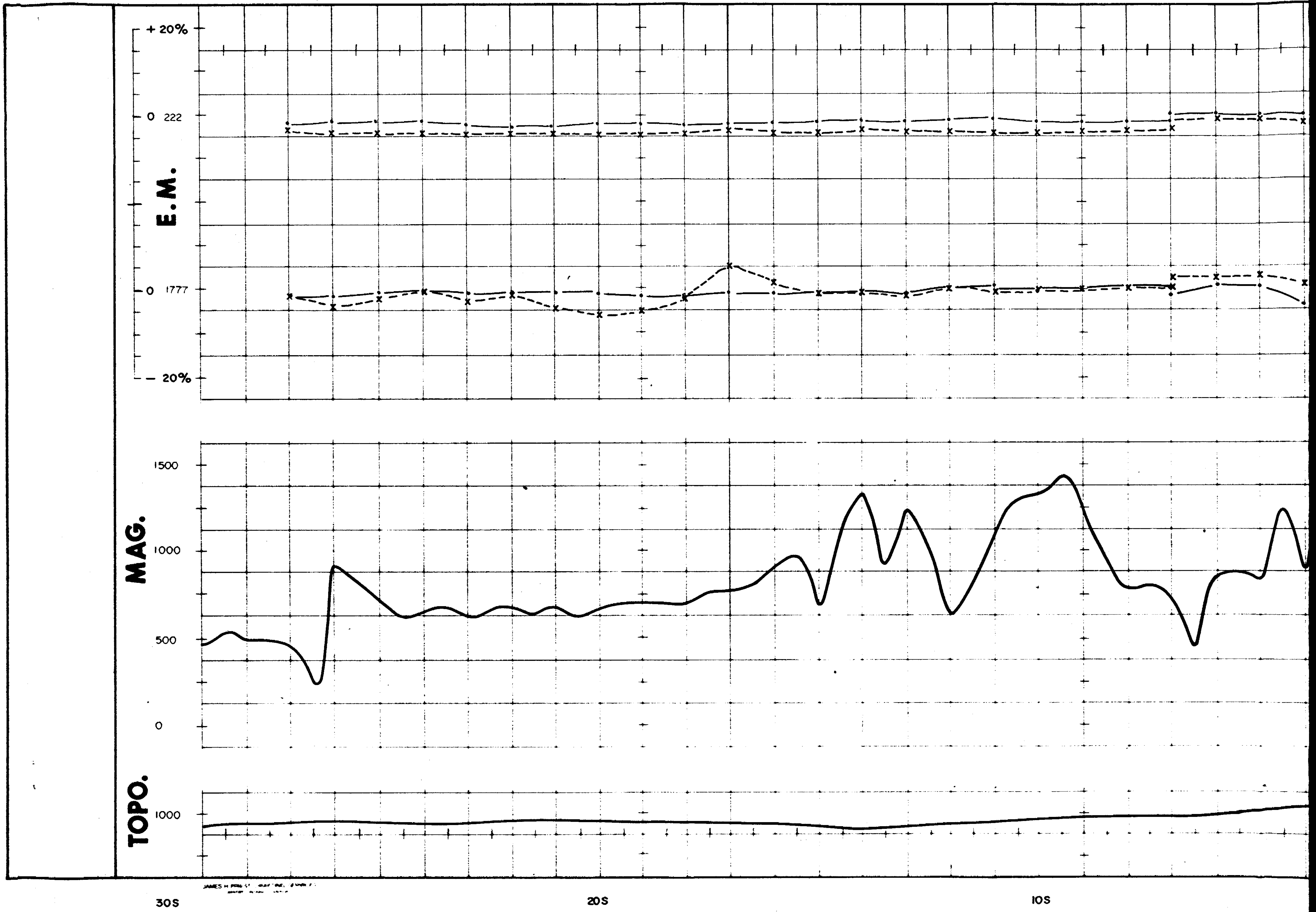

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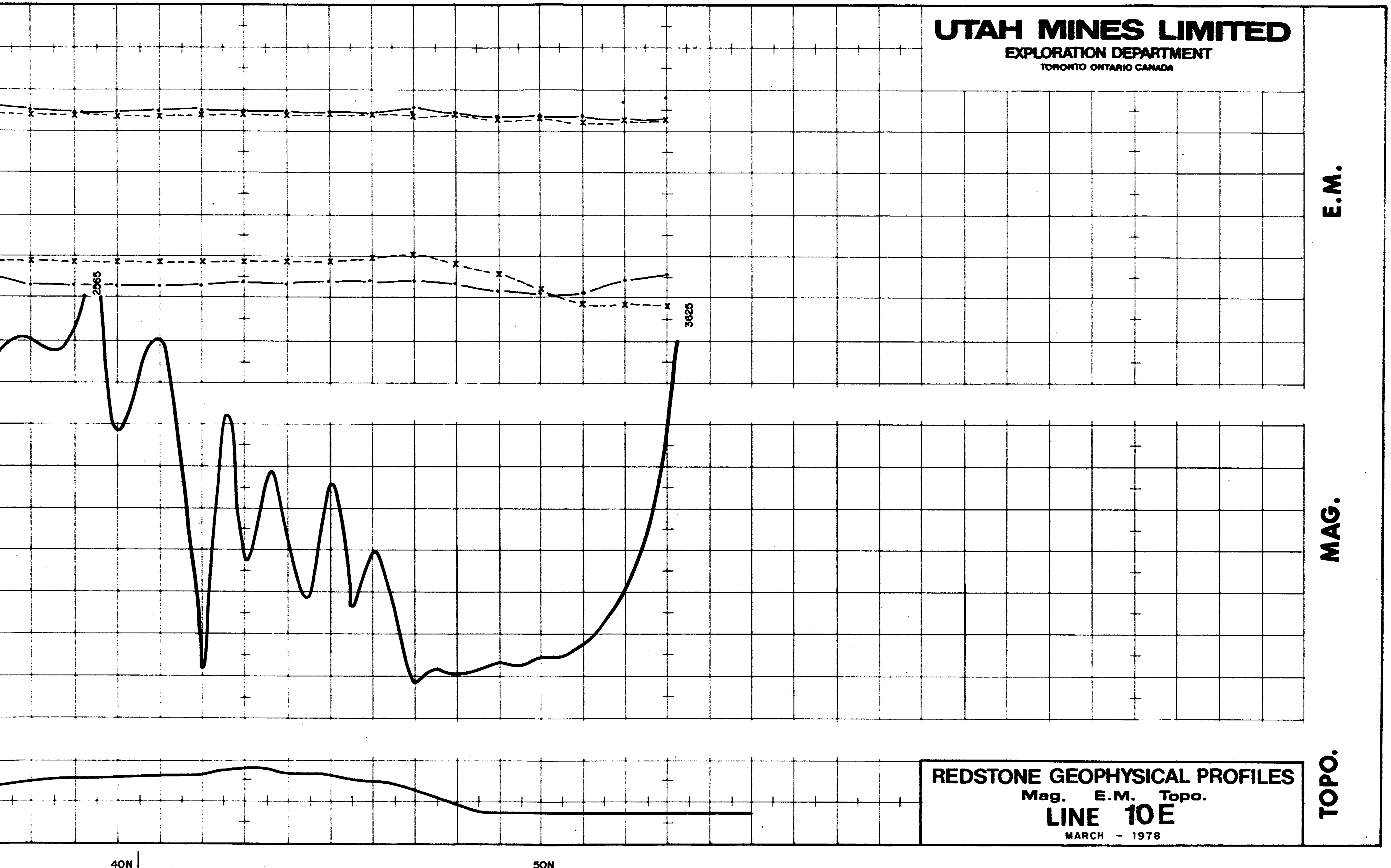

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
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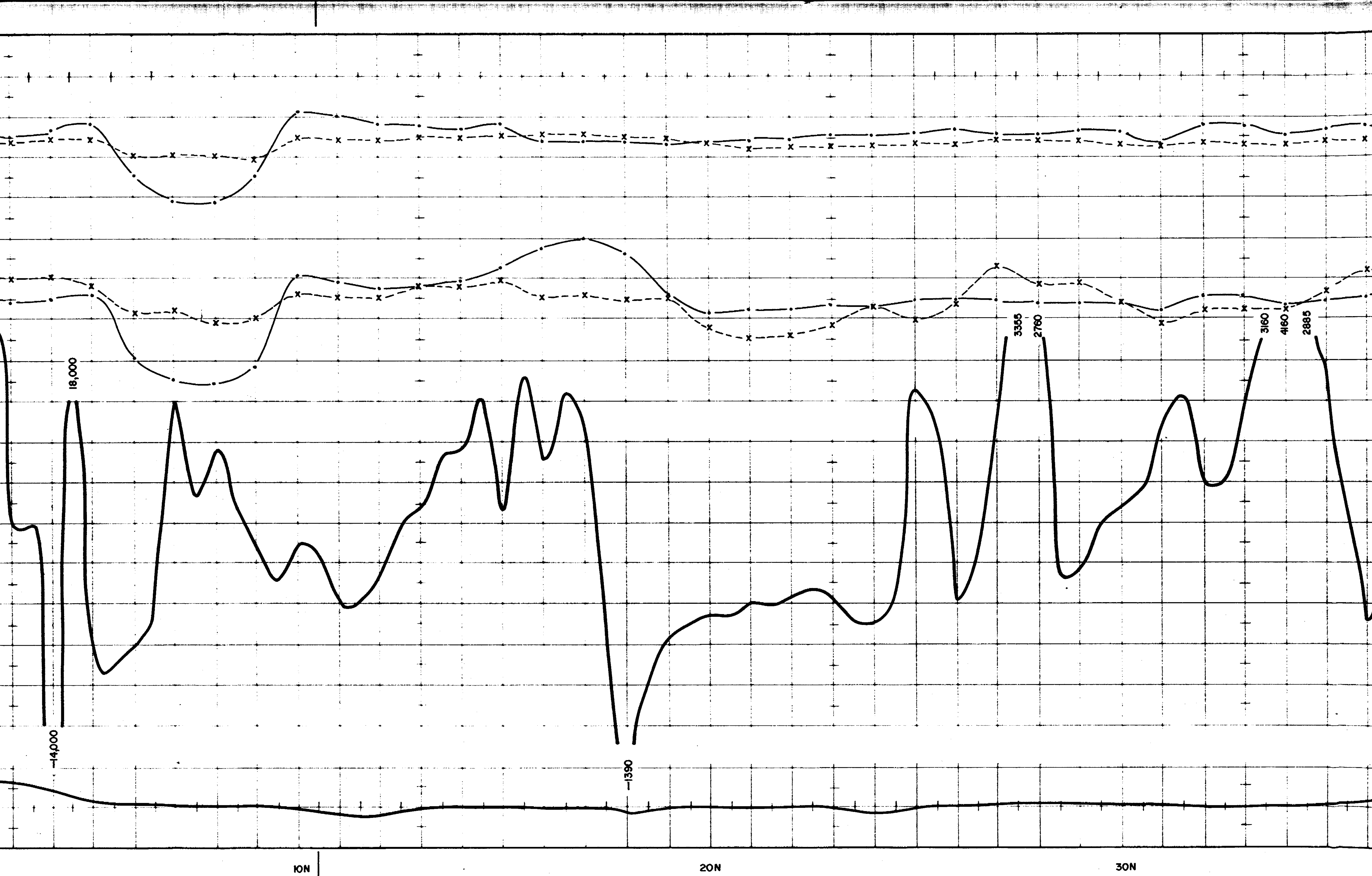

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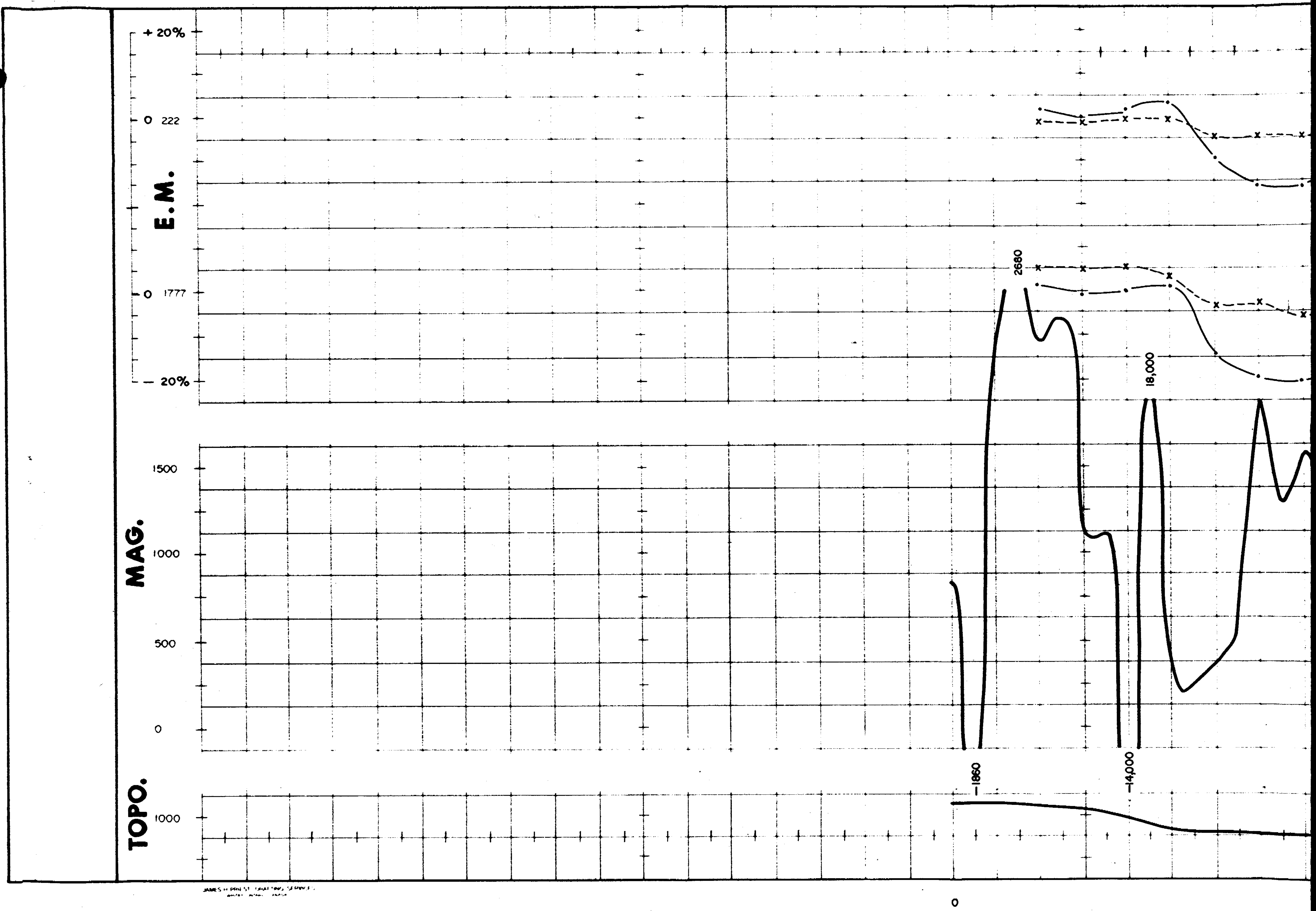

E.M.
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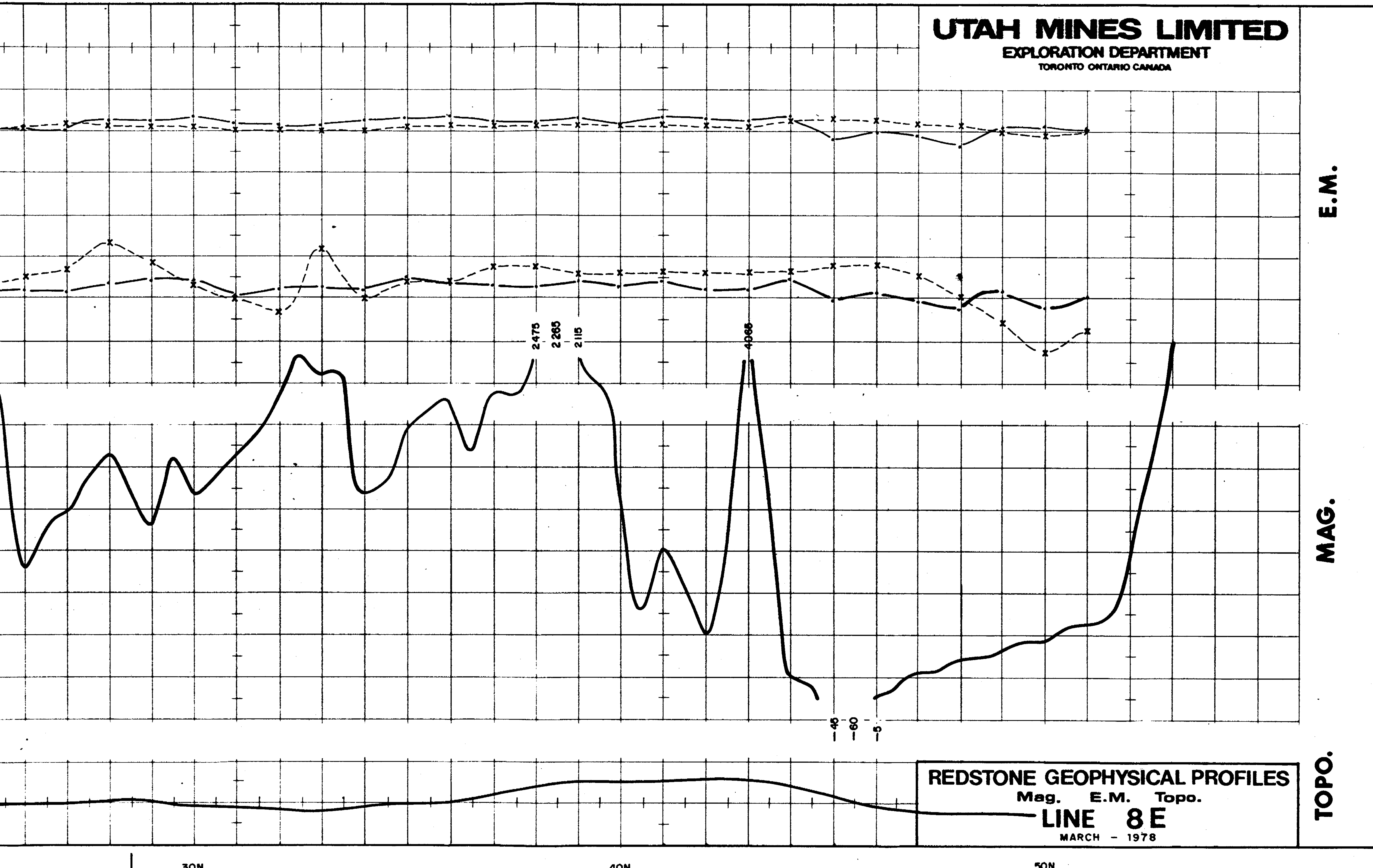

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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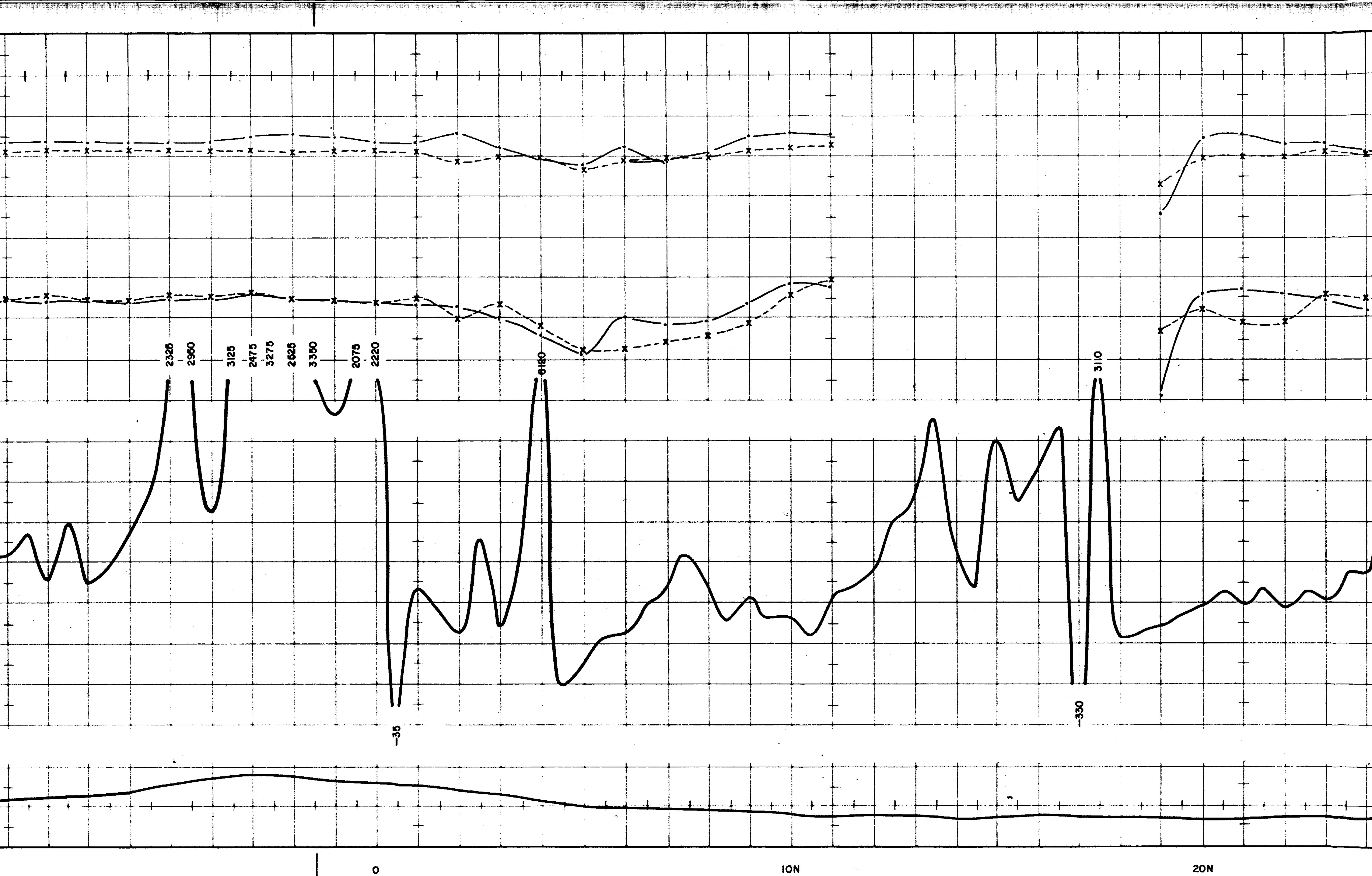
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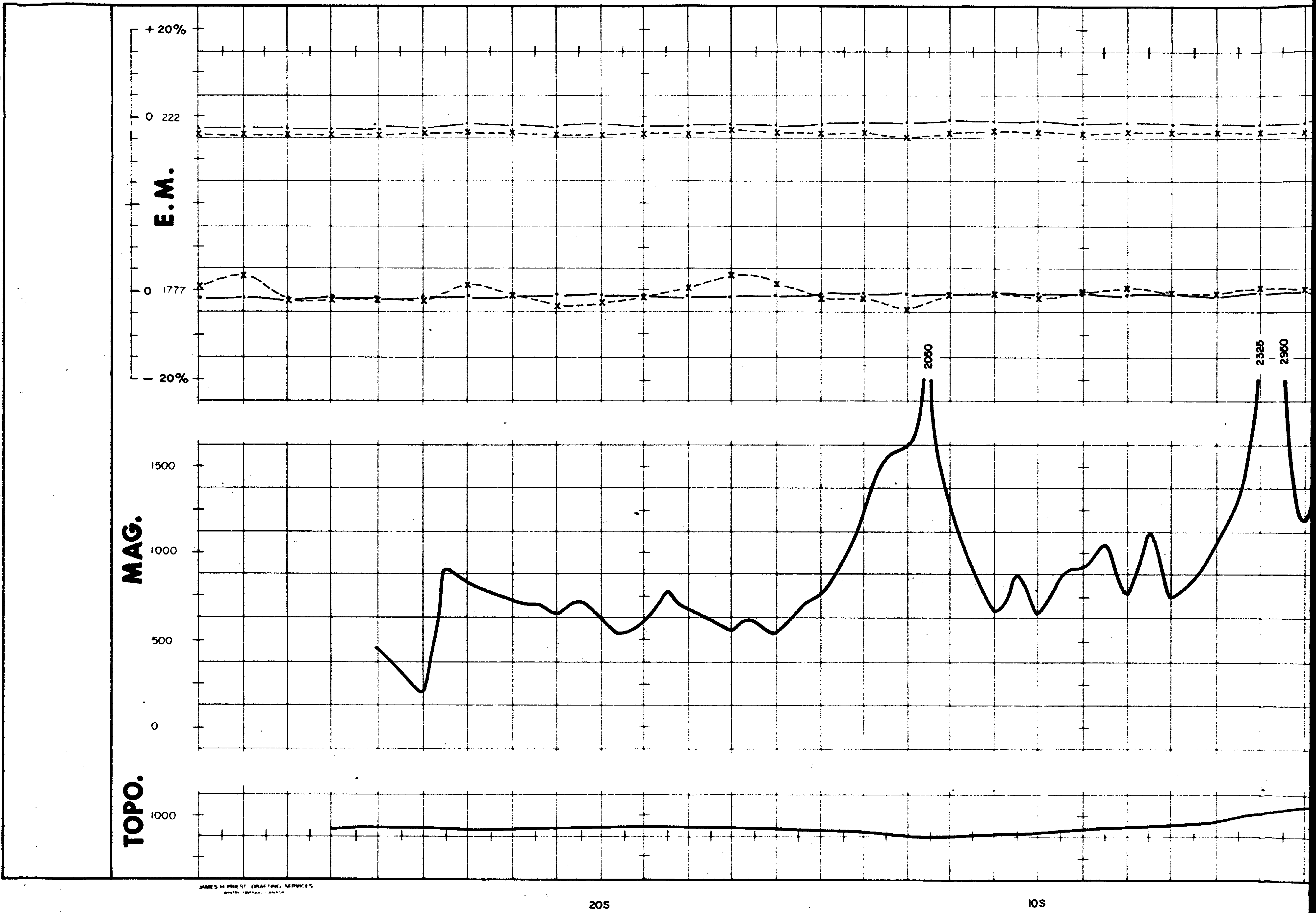

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JAMES H. PRIEST DRAFTING SERVICES
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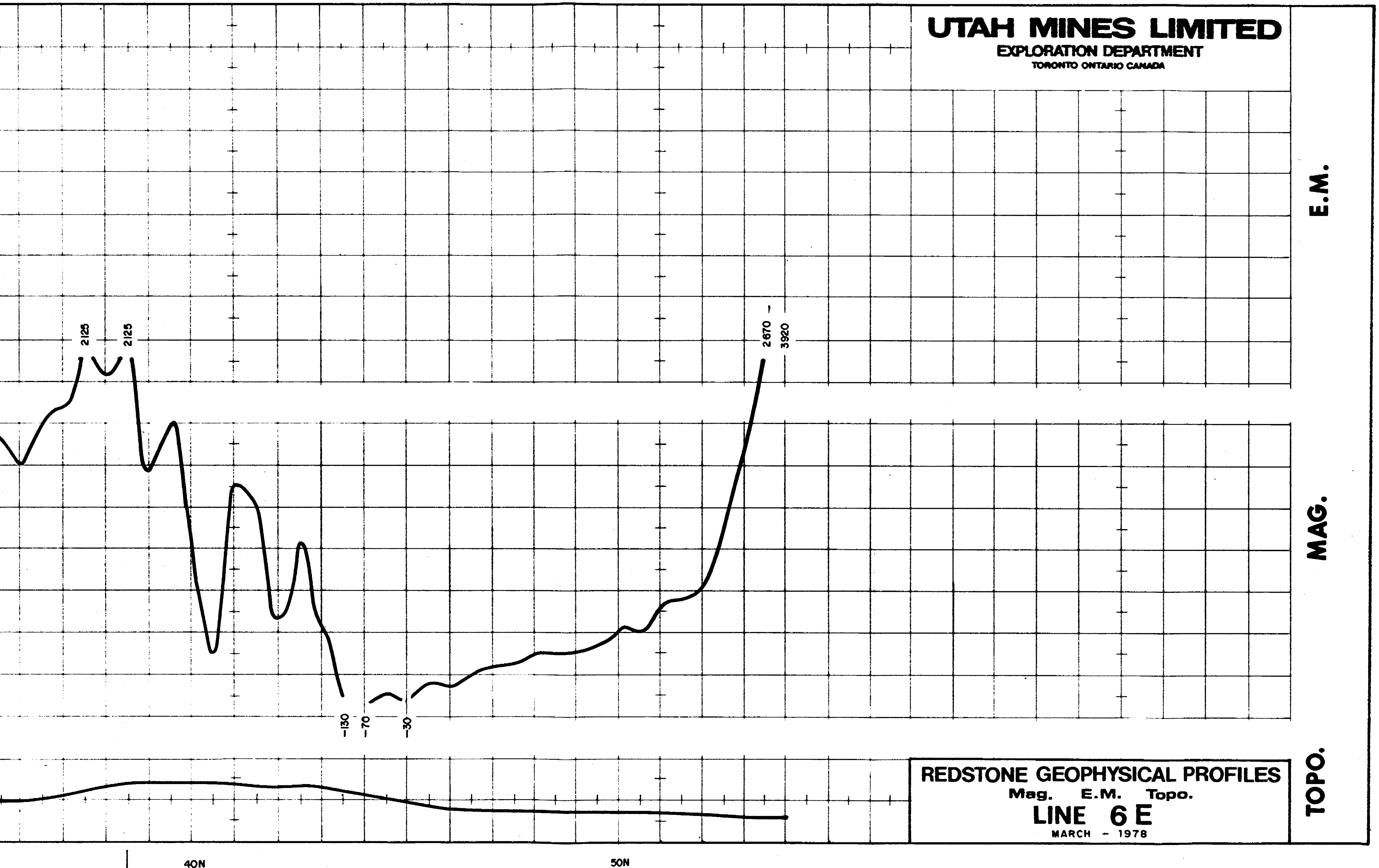
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
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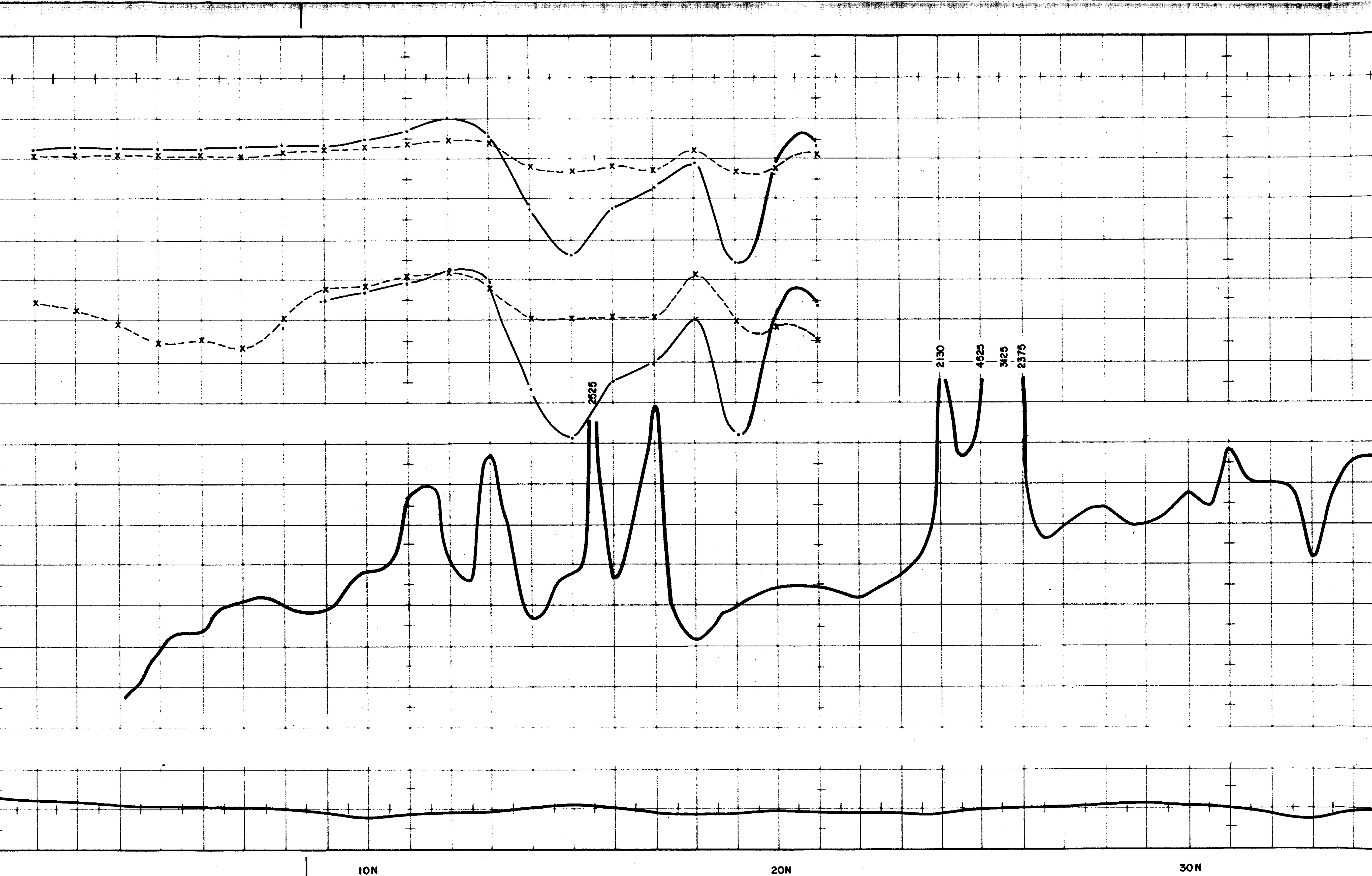
MARCH - 1978



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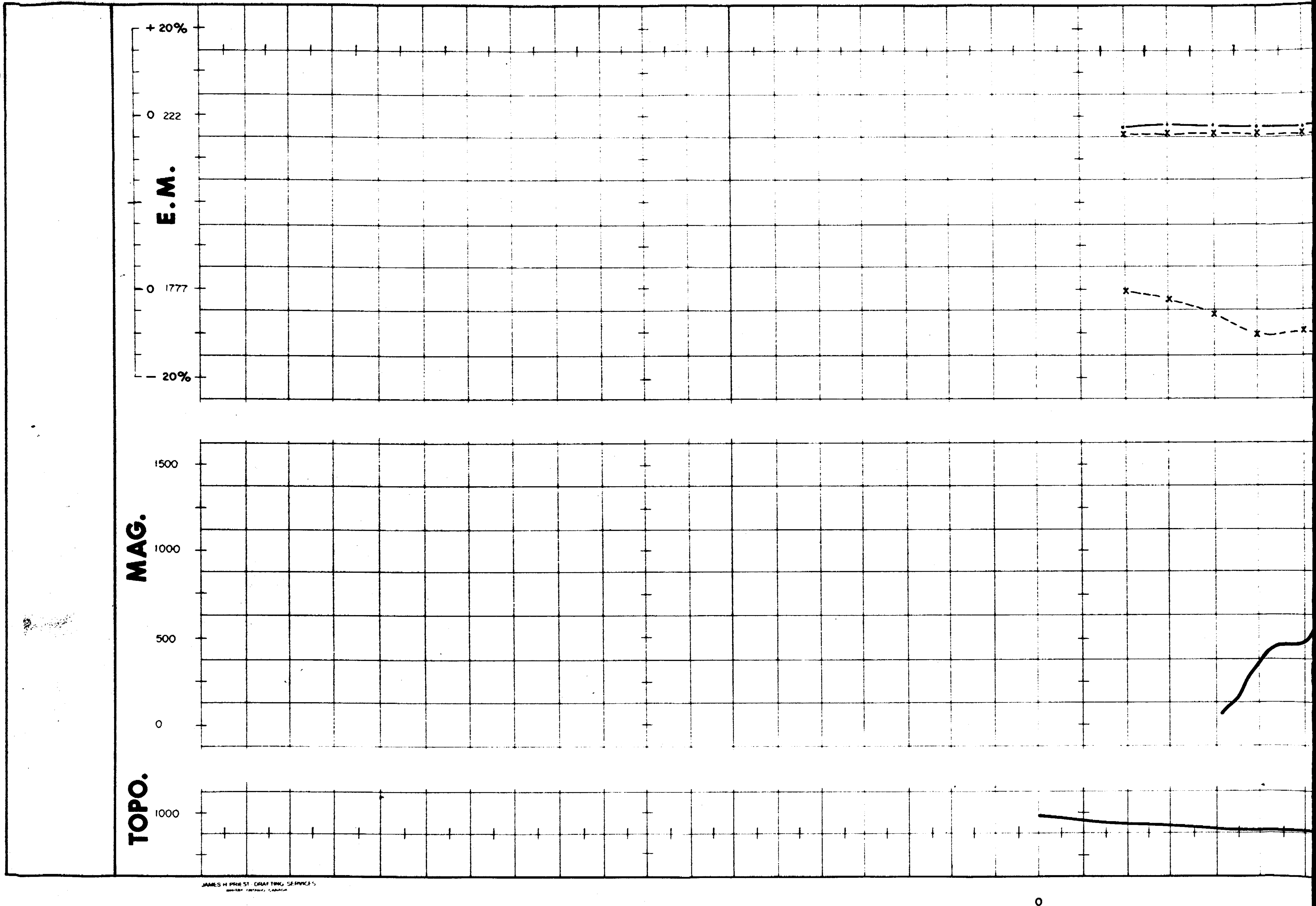
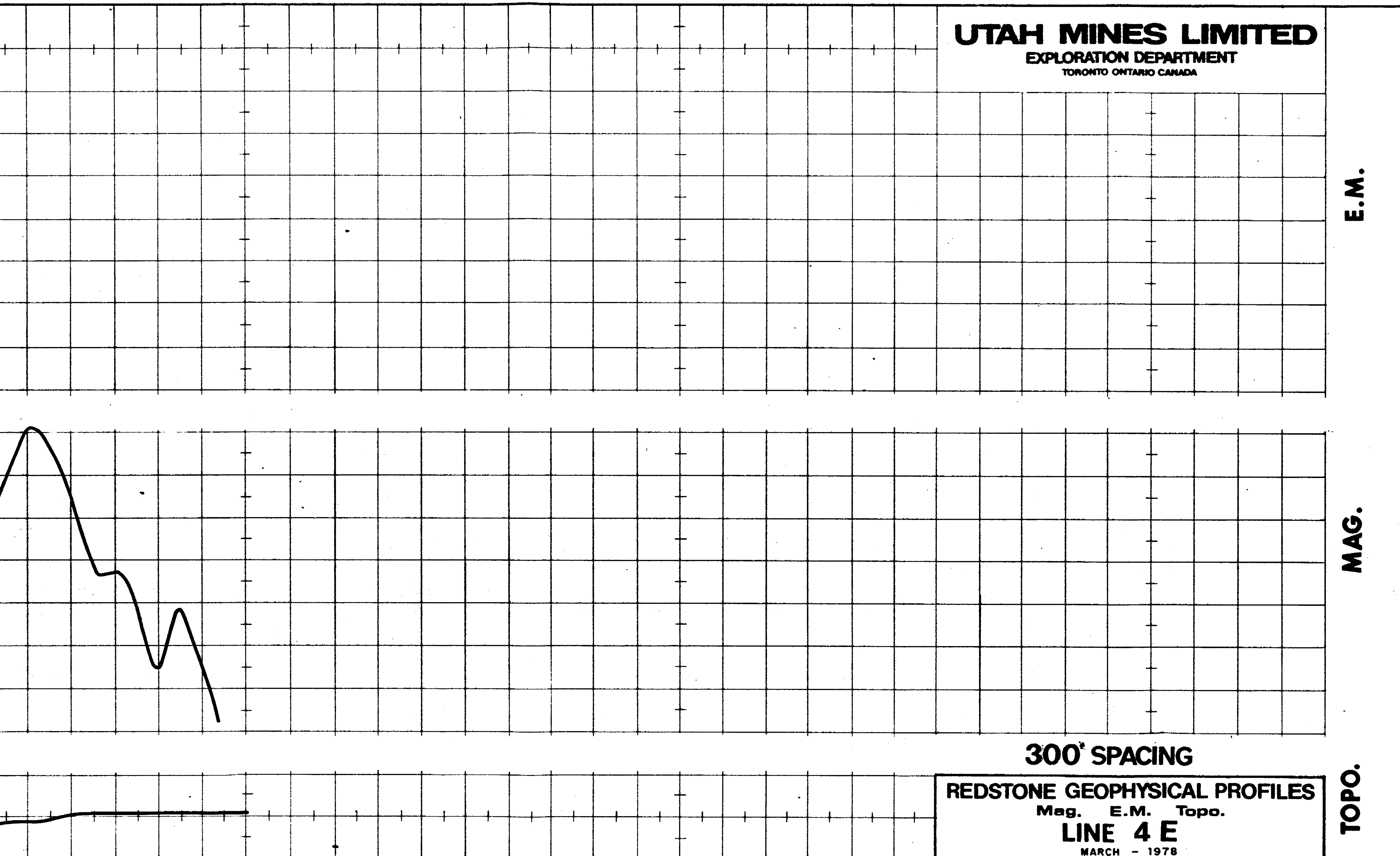


JAMES H PRIEST DRAFTING SERVICES

UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA



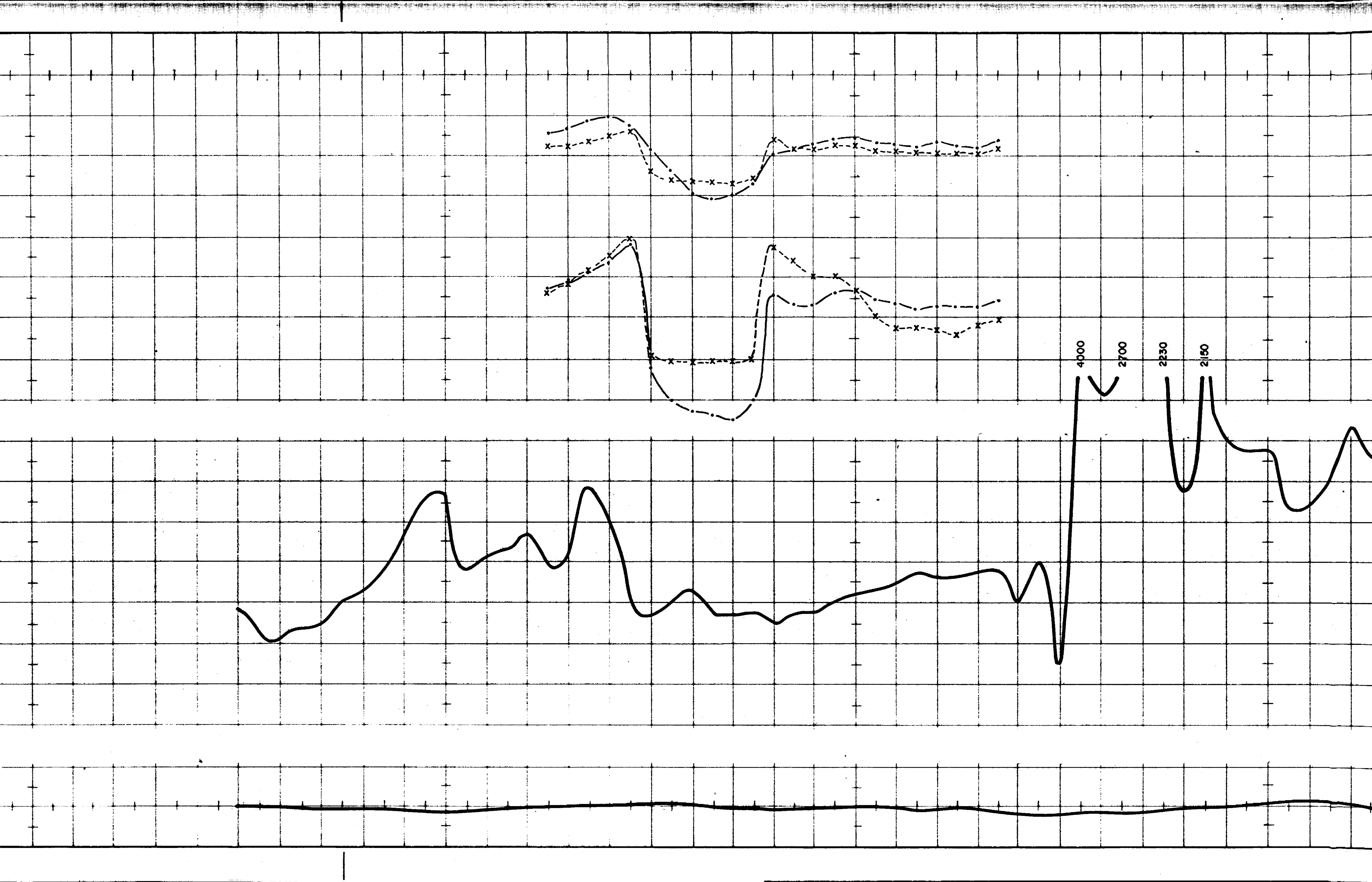
300' SPACING

REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

LINE 4 E

MARCH - 1978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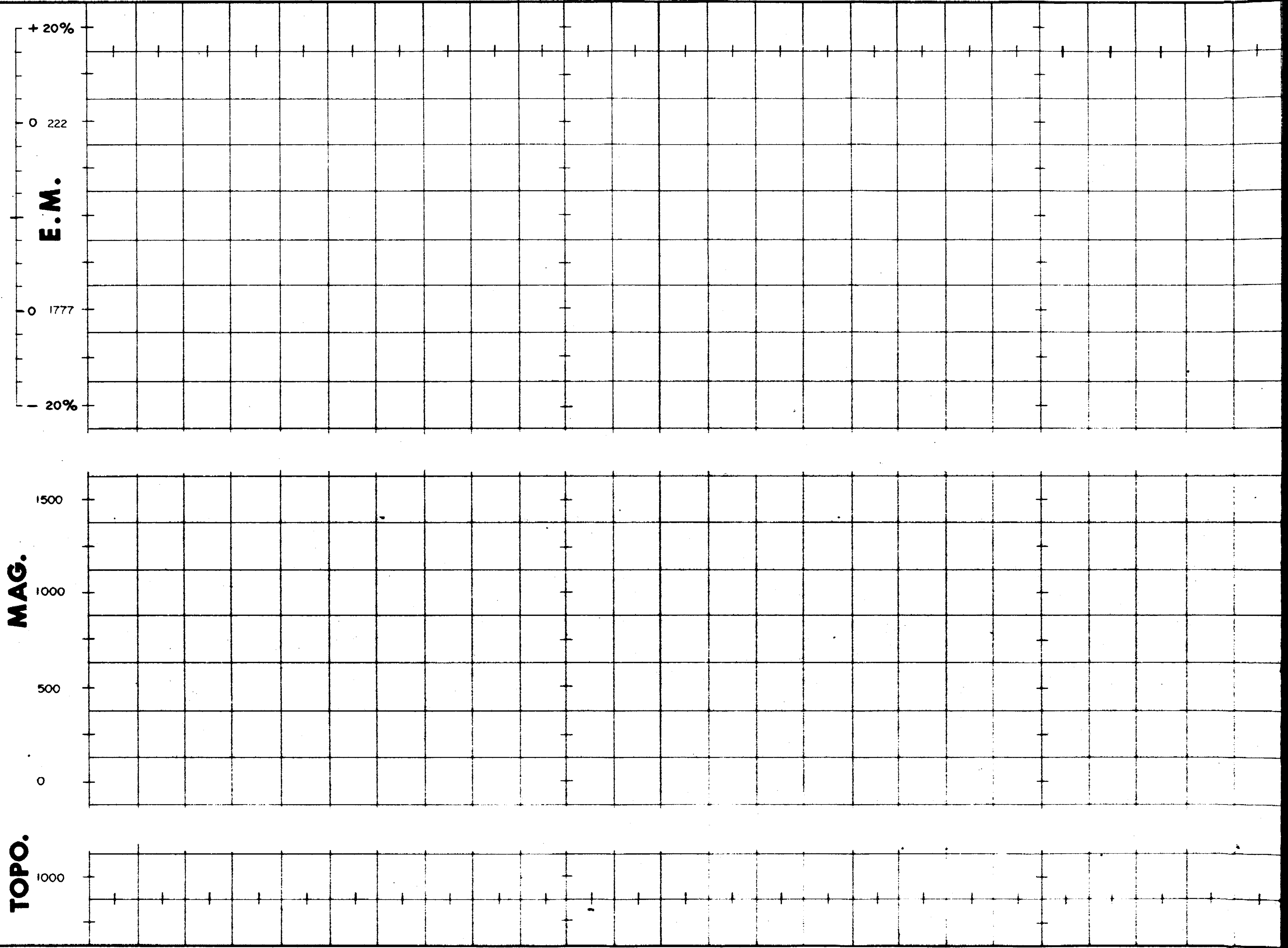
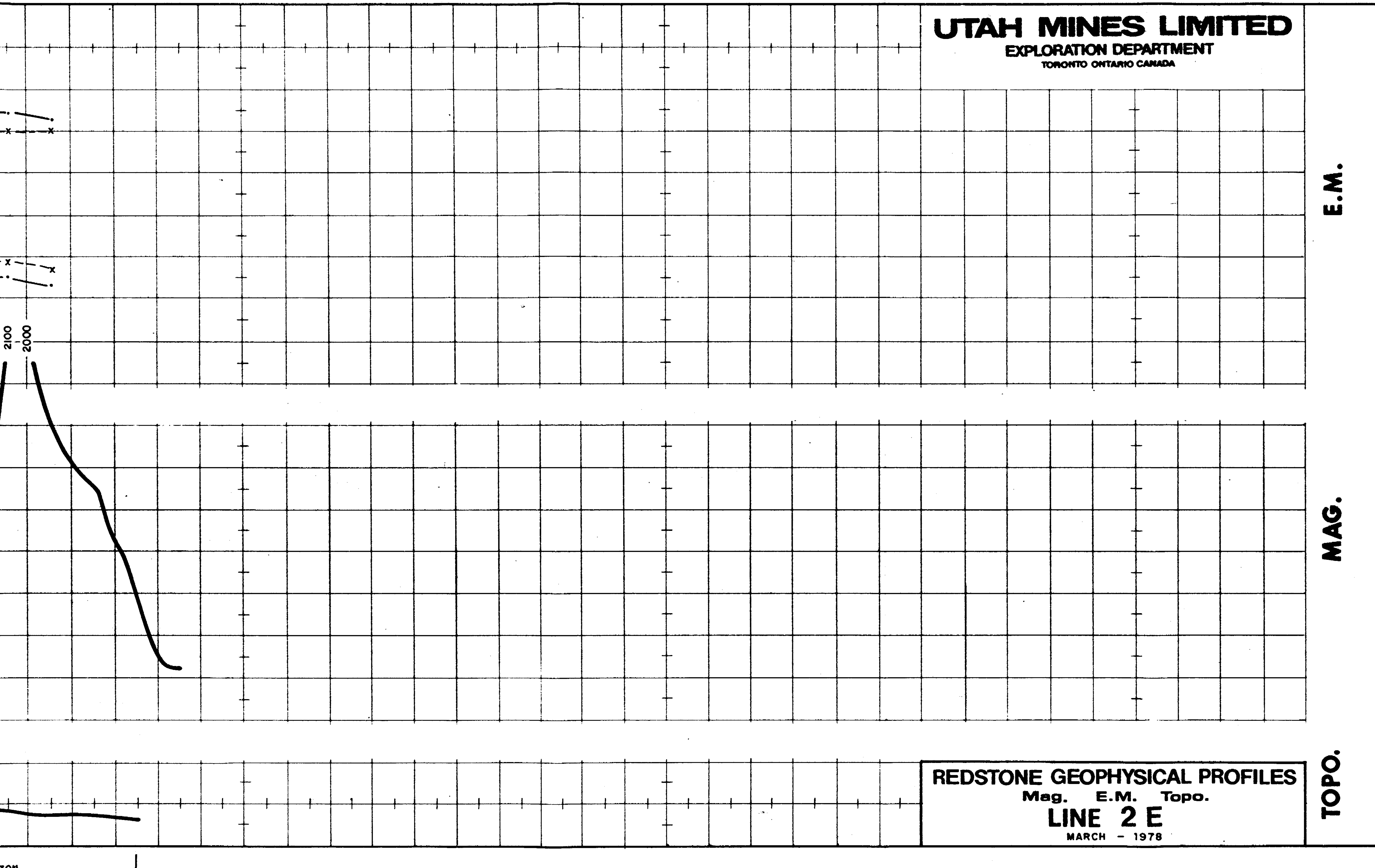


JAMES H PRIEST DRAFTING SERVICES



UTAH MINES LIMITED

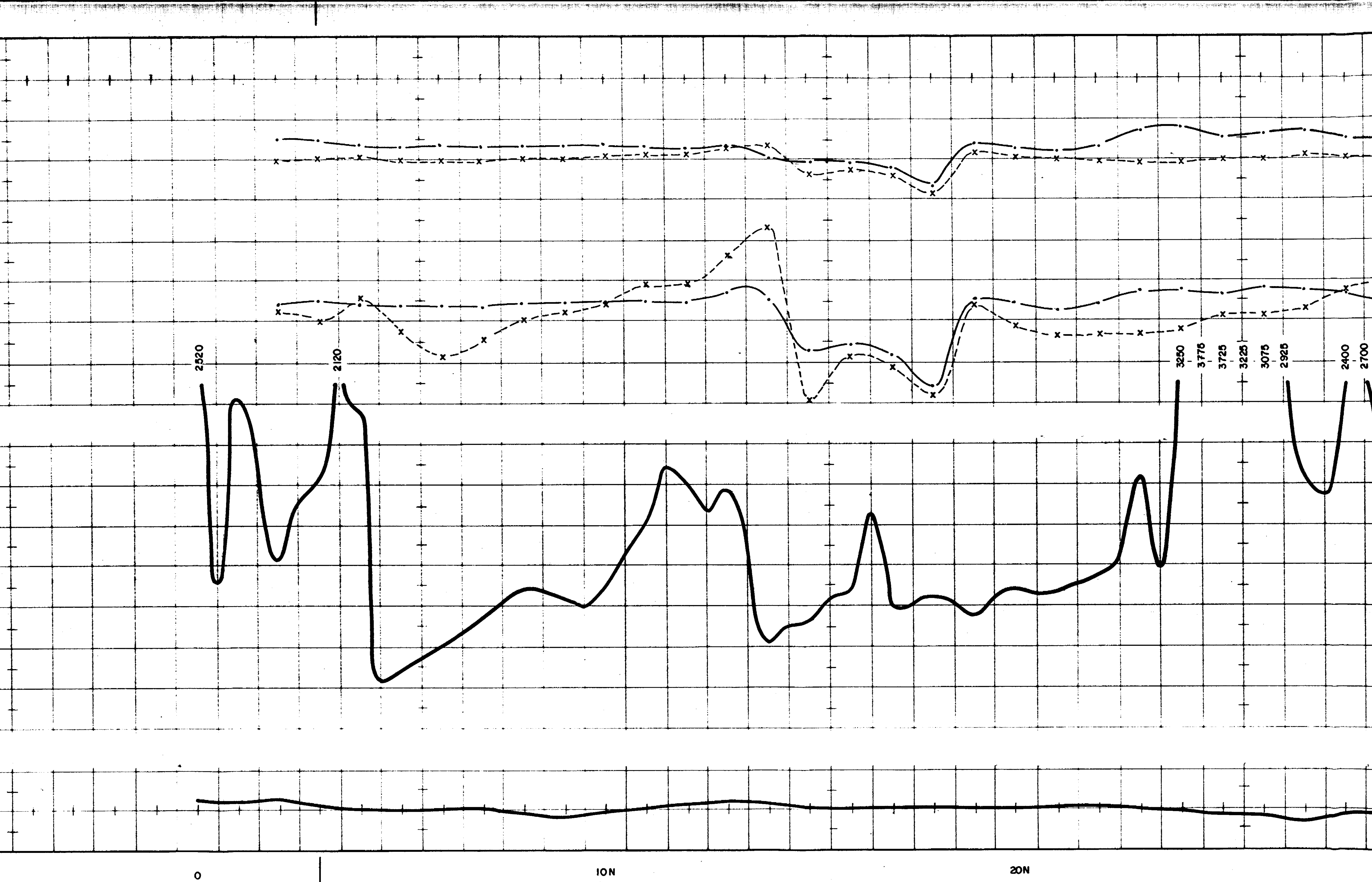
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA

REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

LINE 2 E

MARCH - 1978



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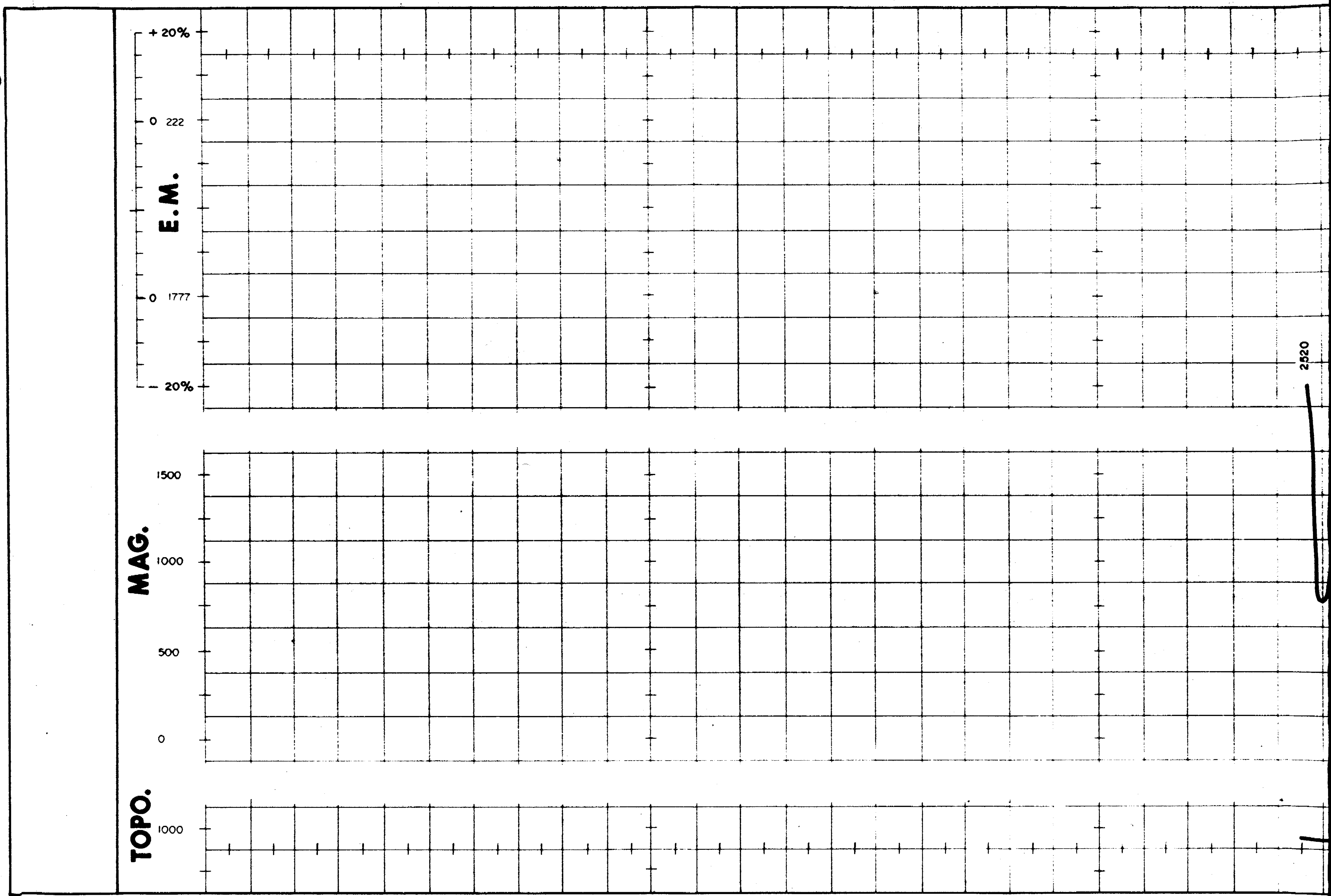

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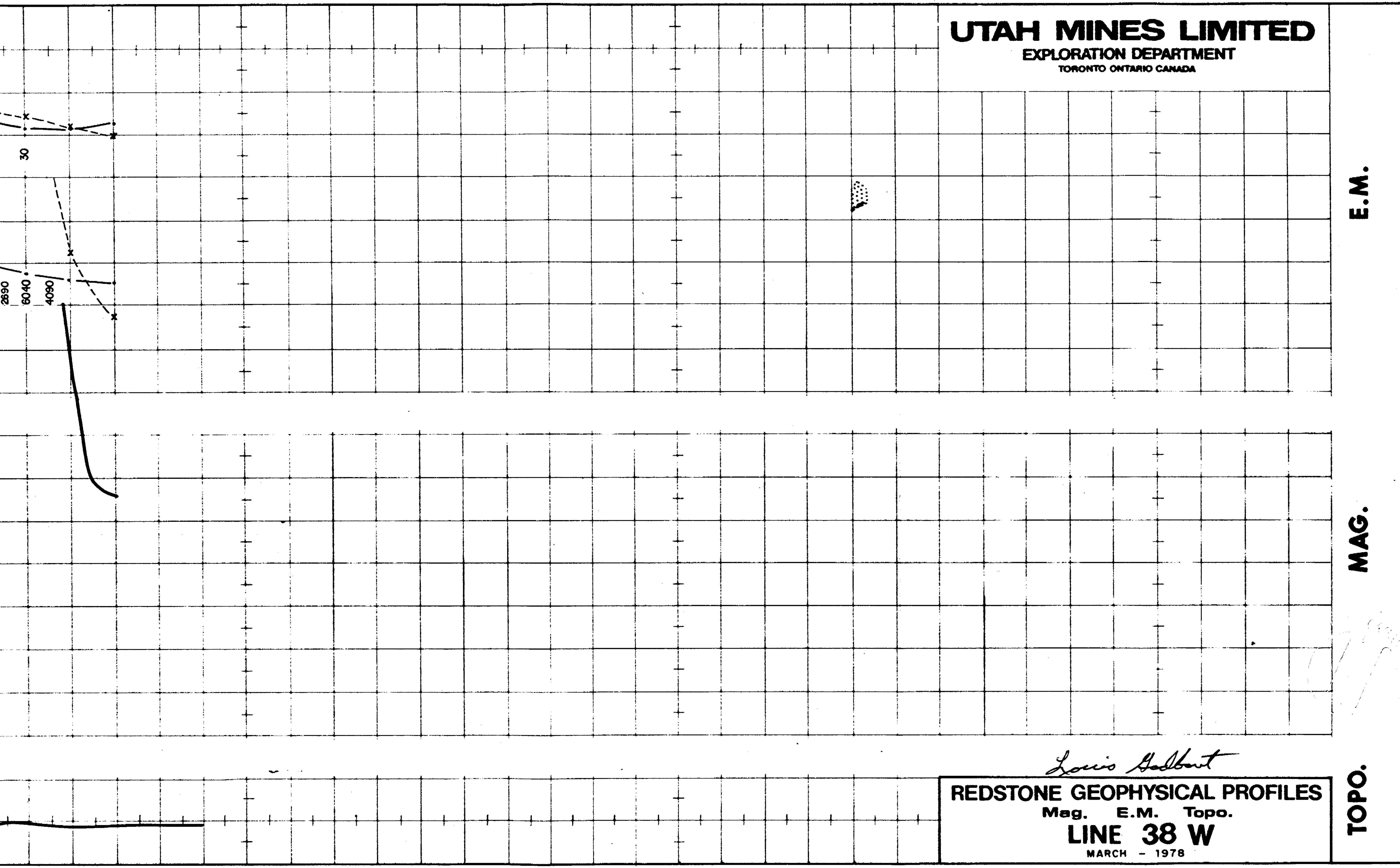


UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA

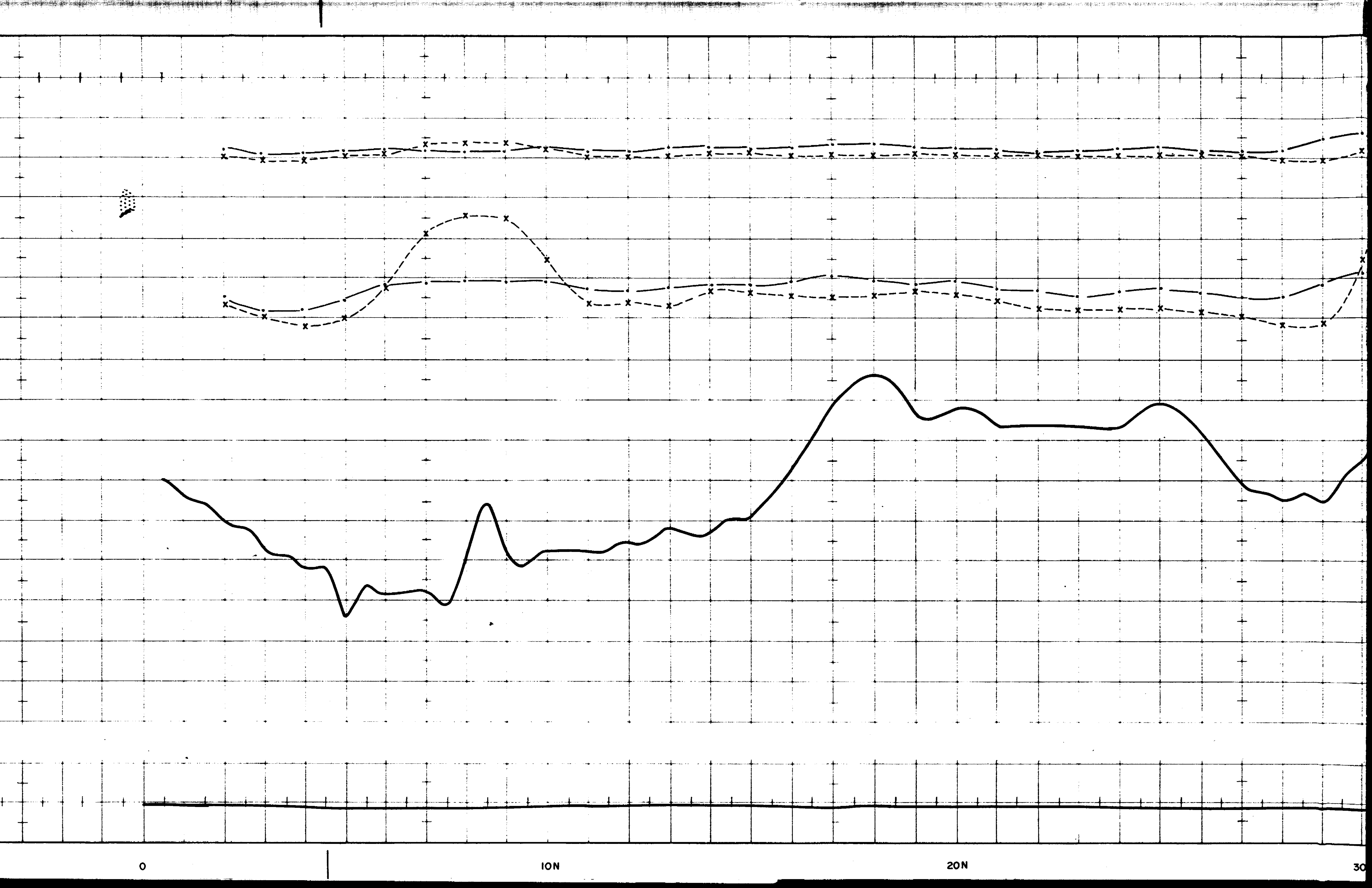
Louis Godbout

REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

LINE 38 W

MARCH - 1978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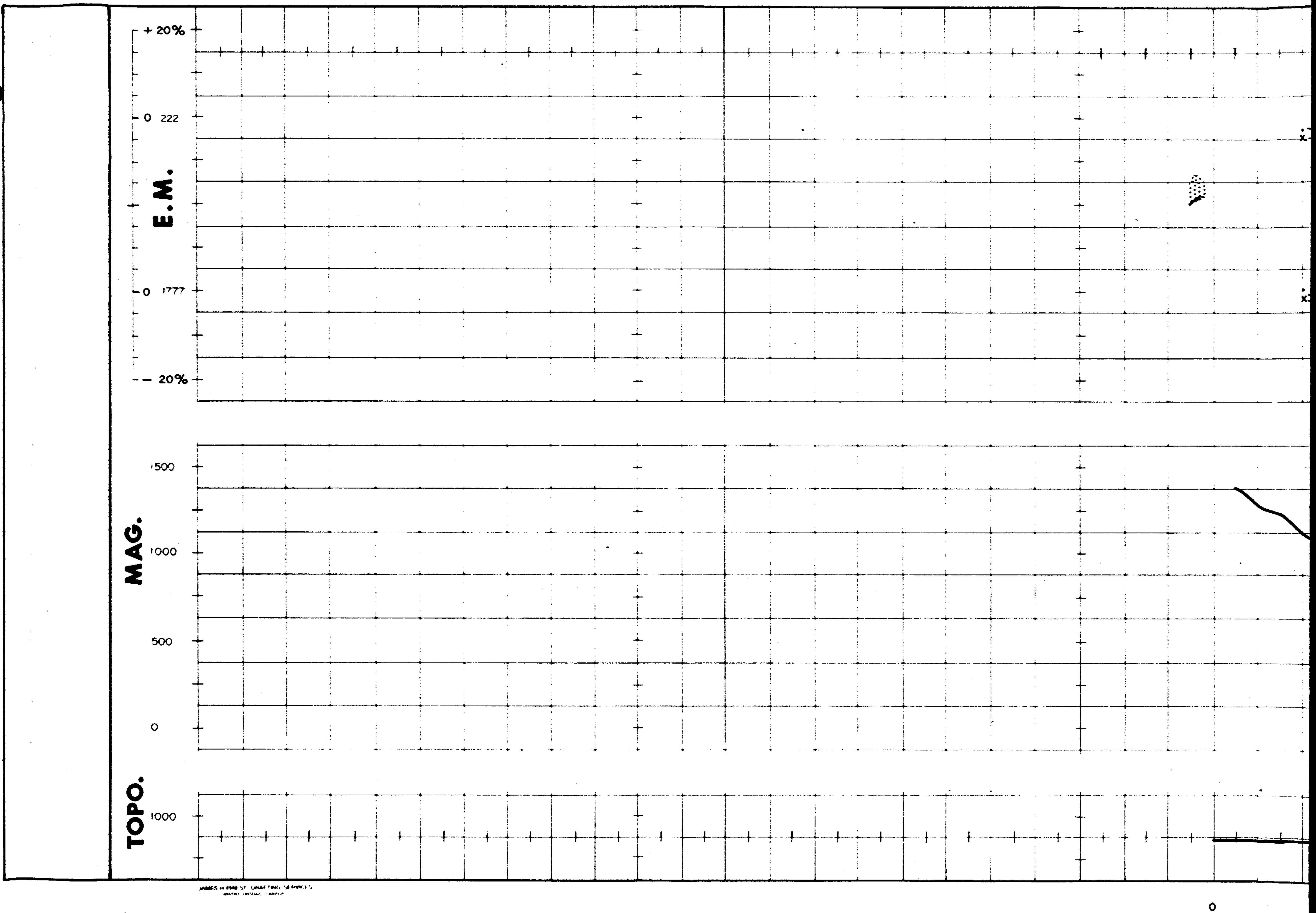
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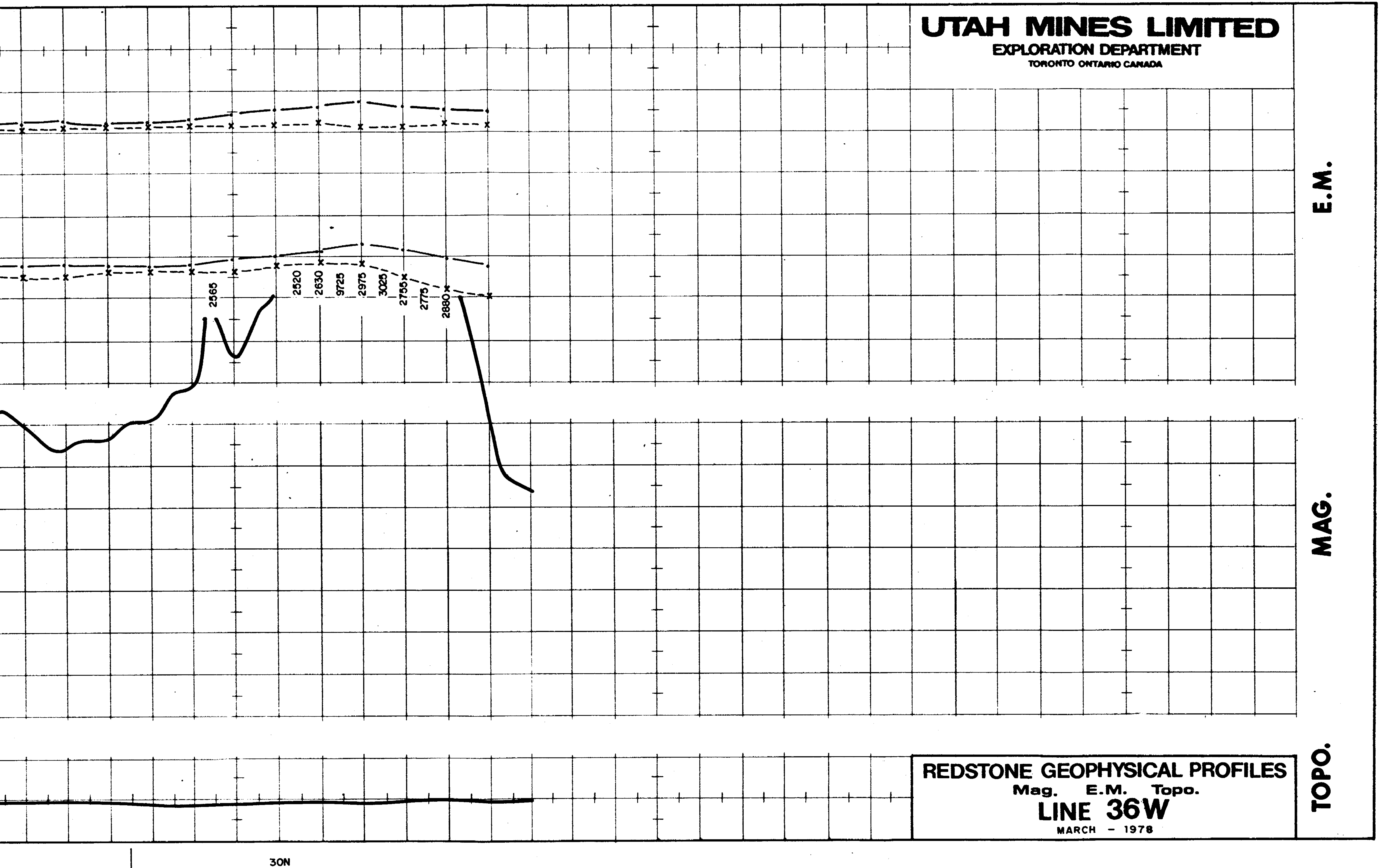
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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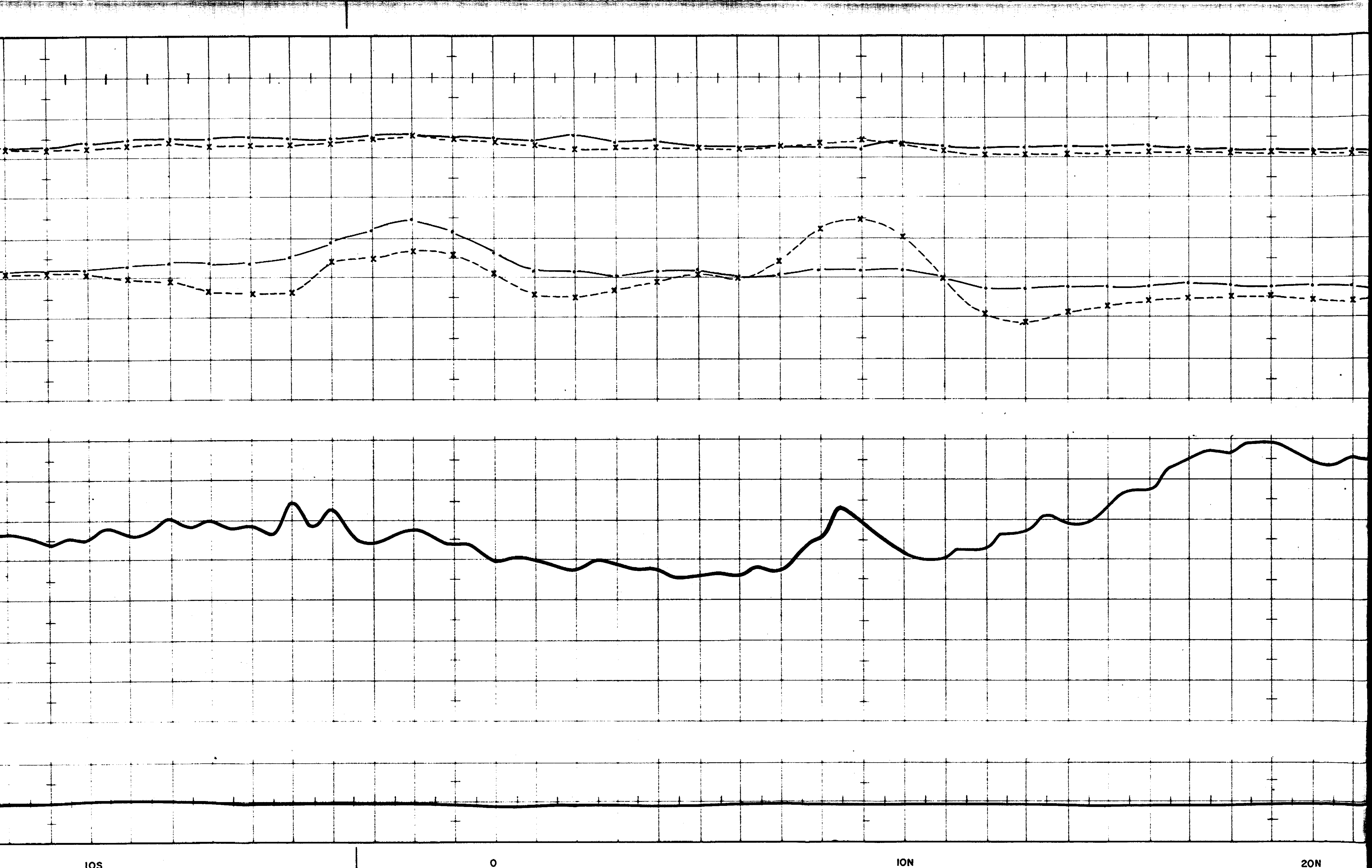

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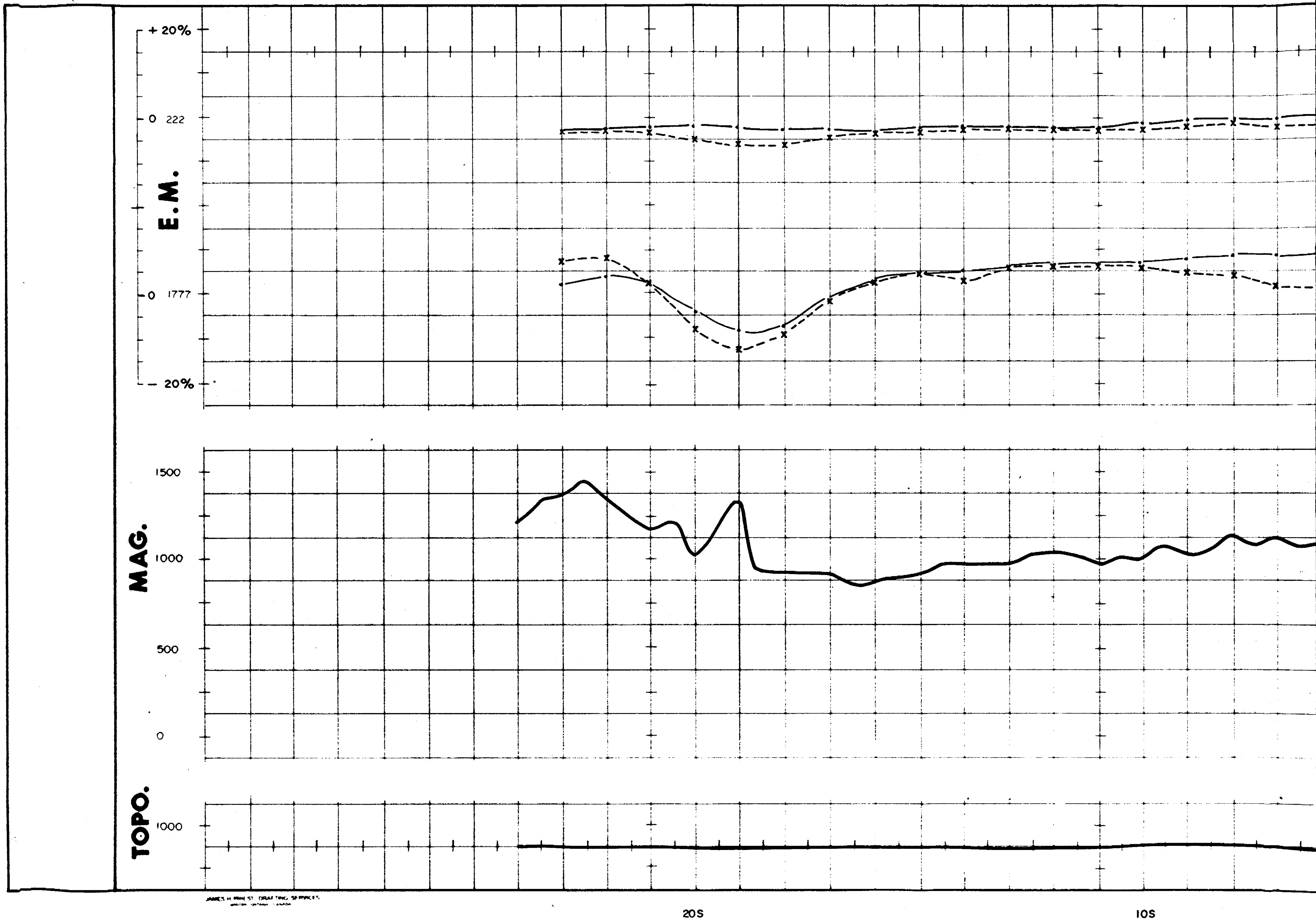
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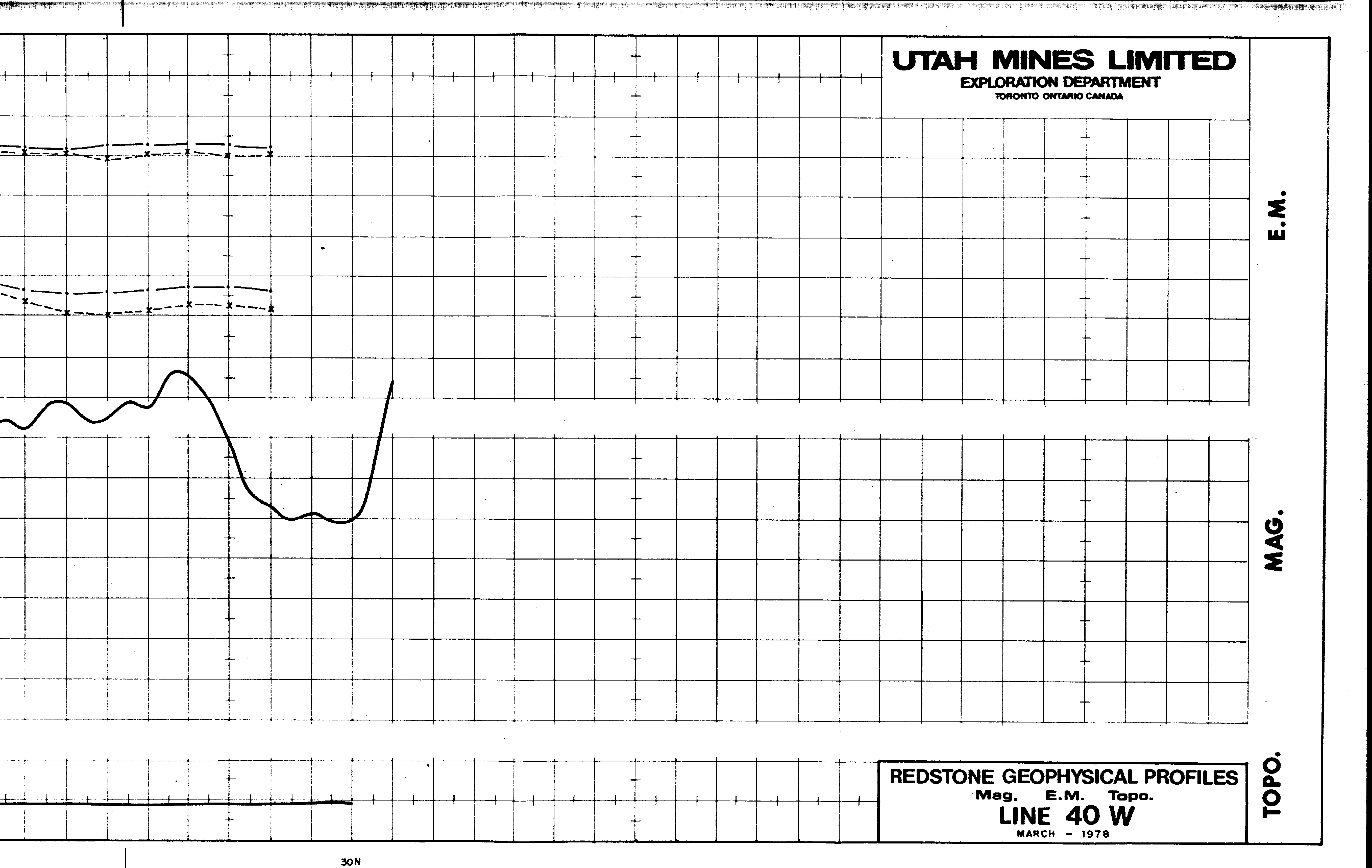

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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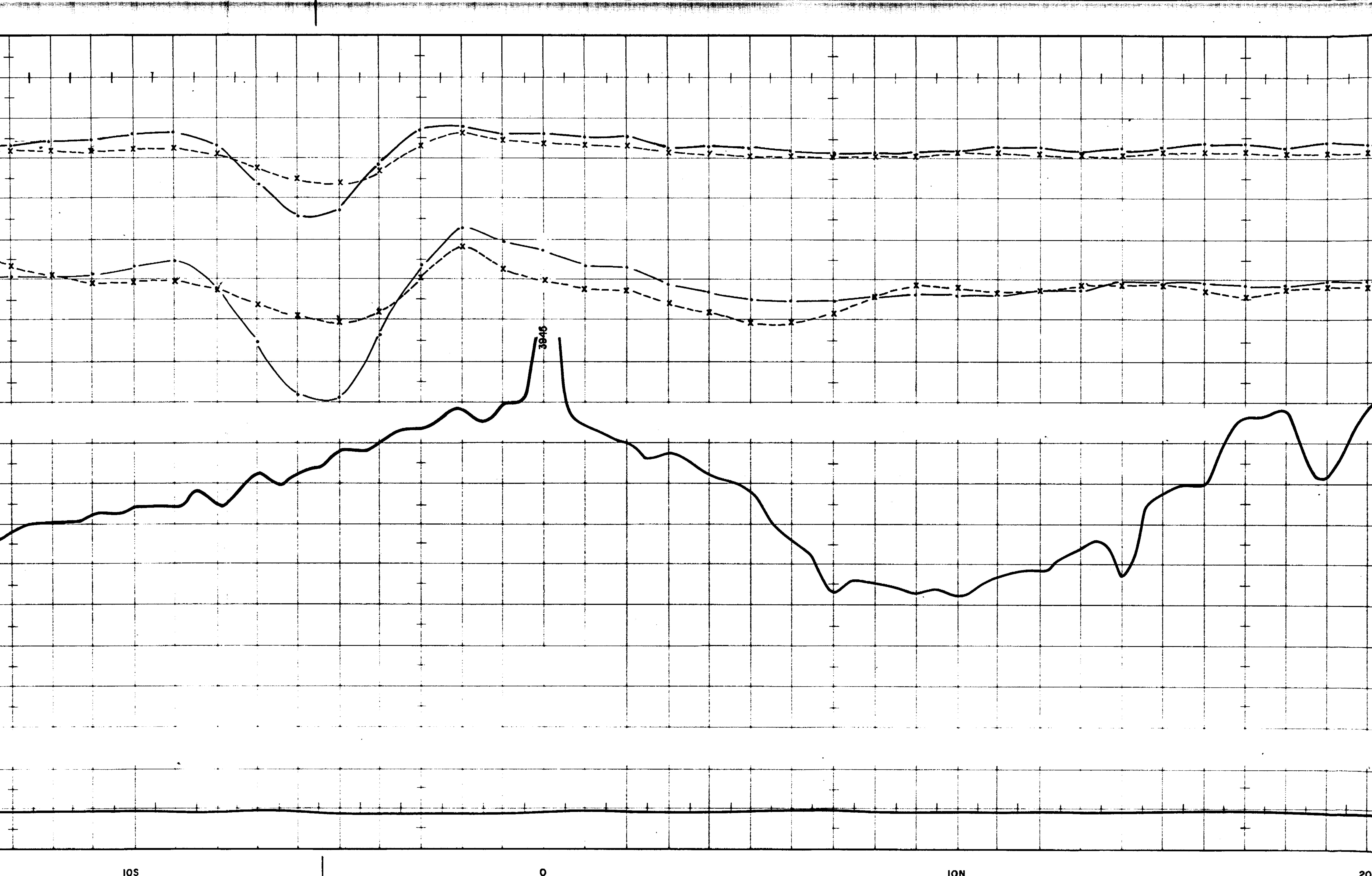

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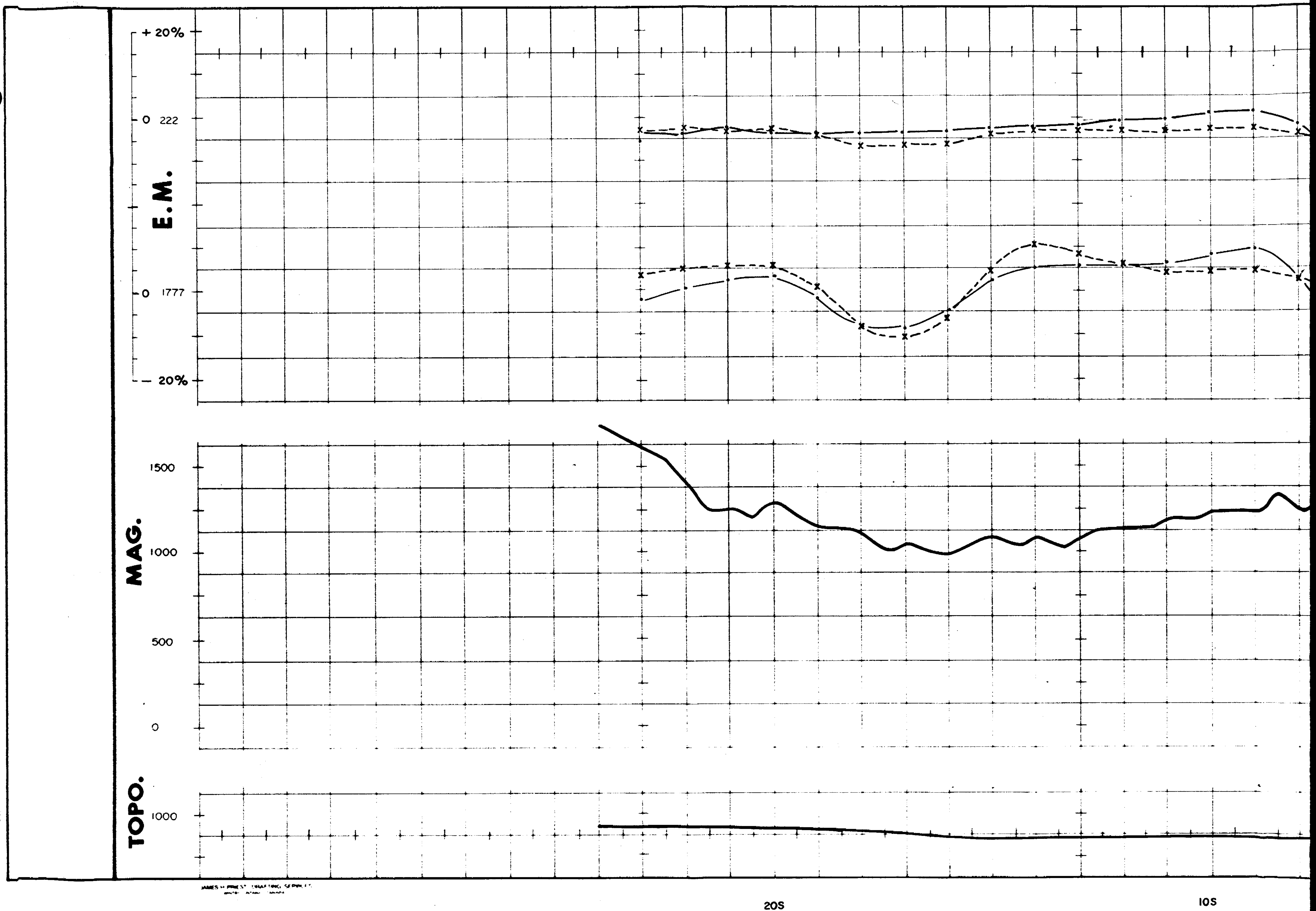

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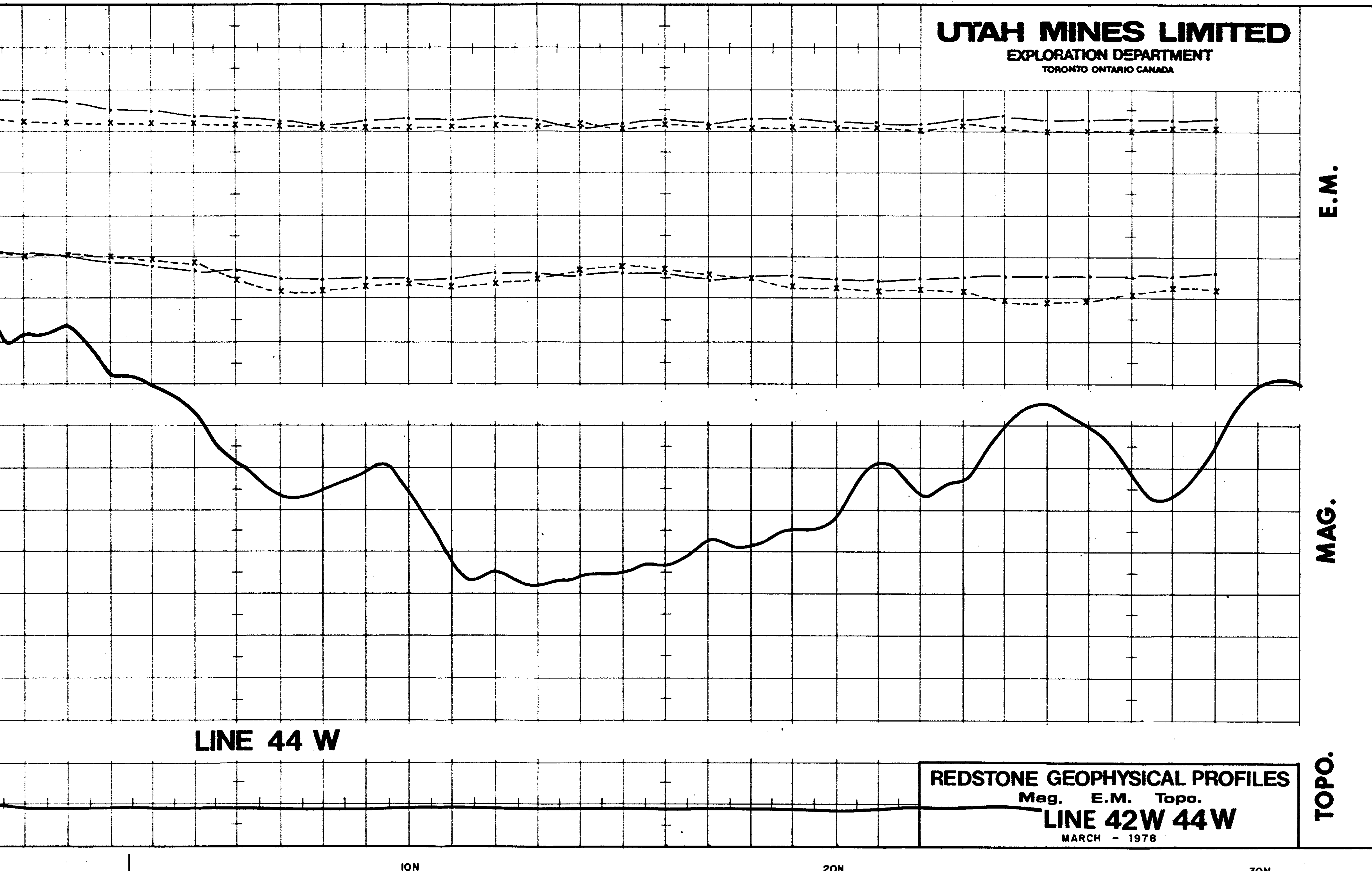
UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA



REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

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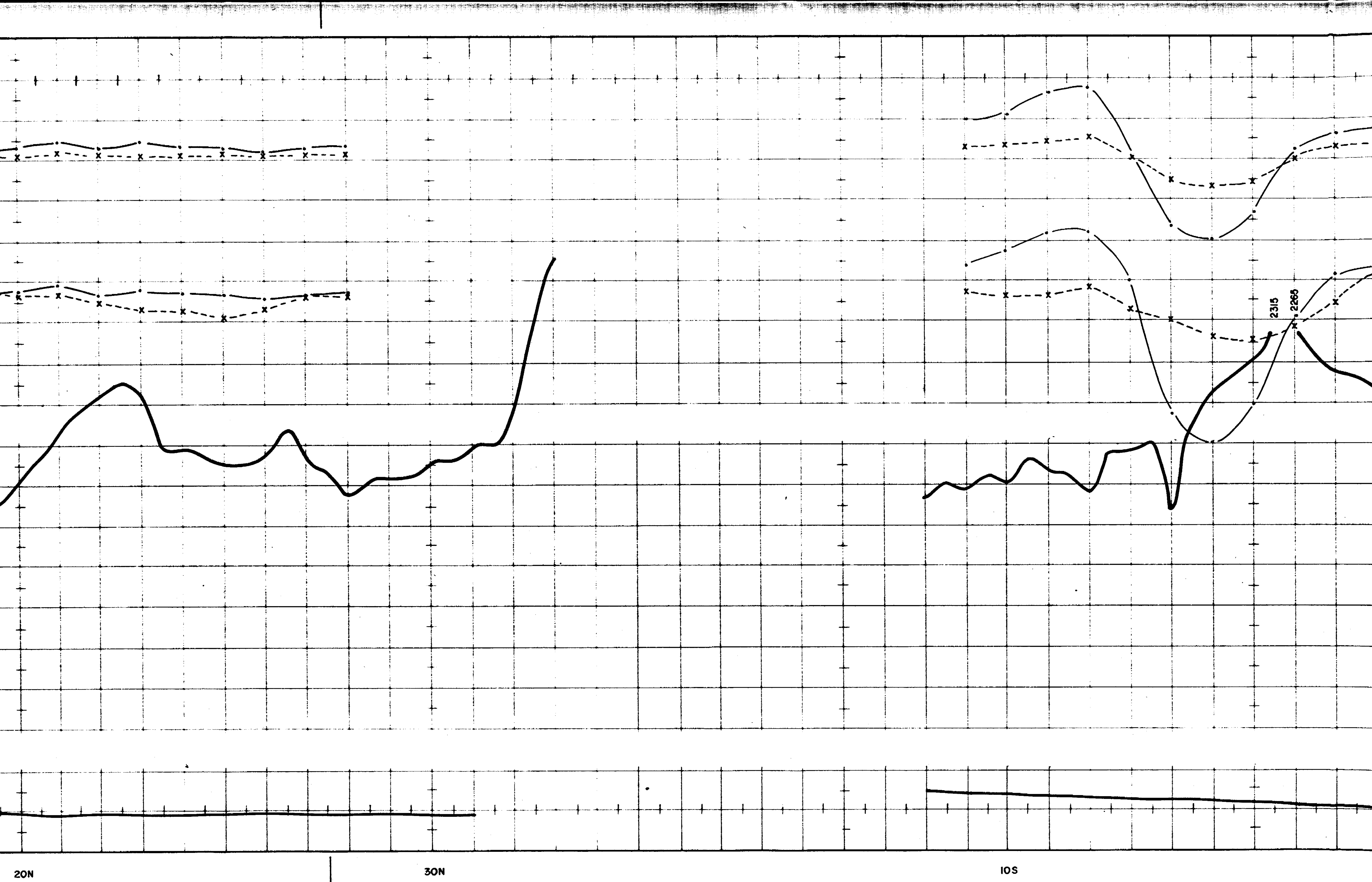
MARCH - 1978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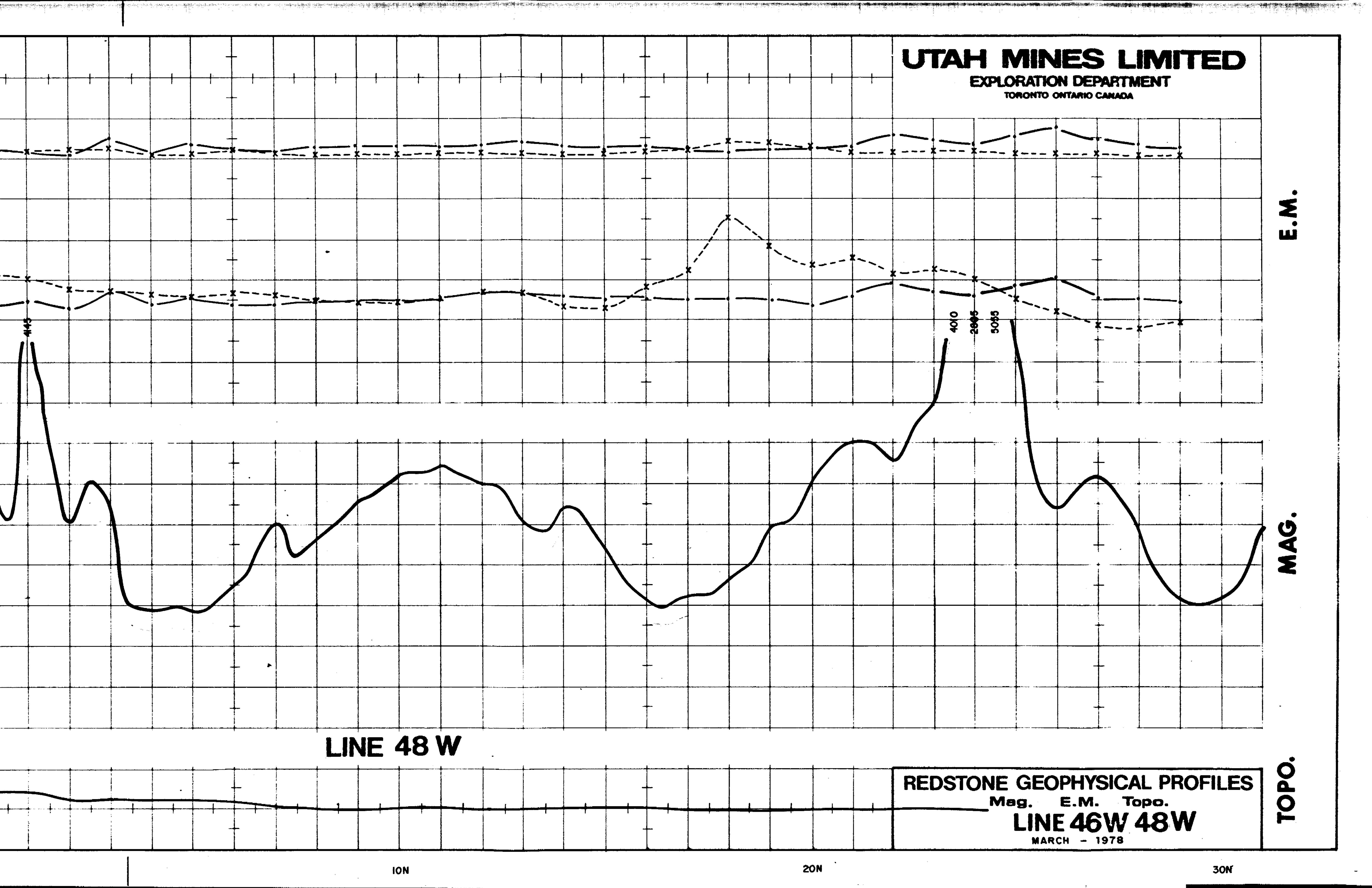
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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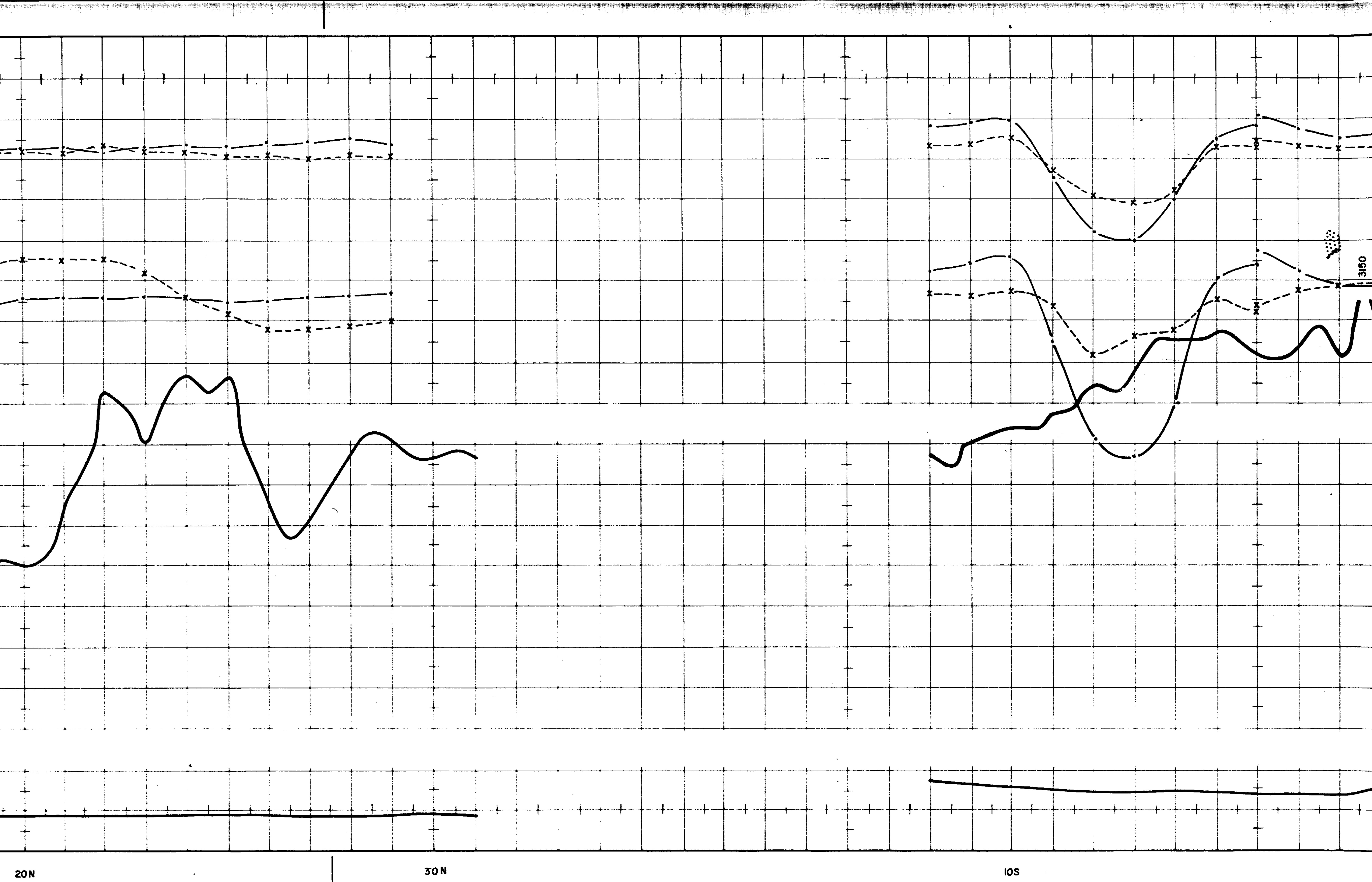
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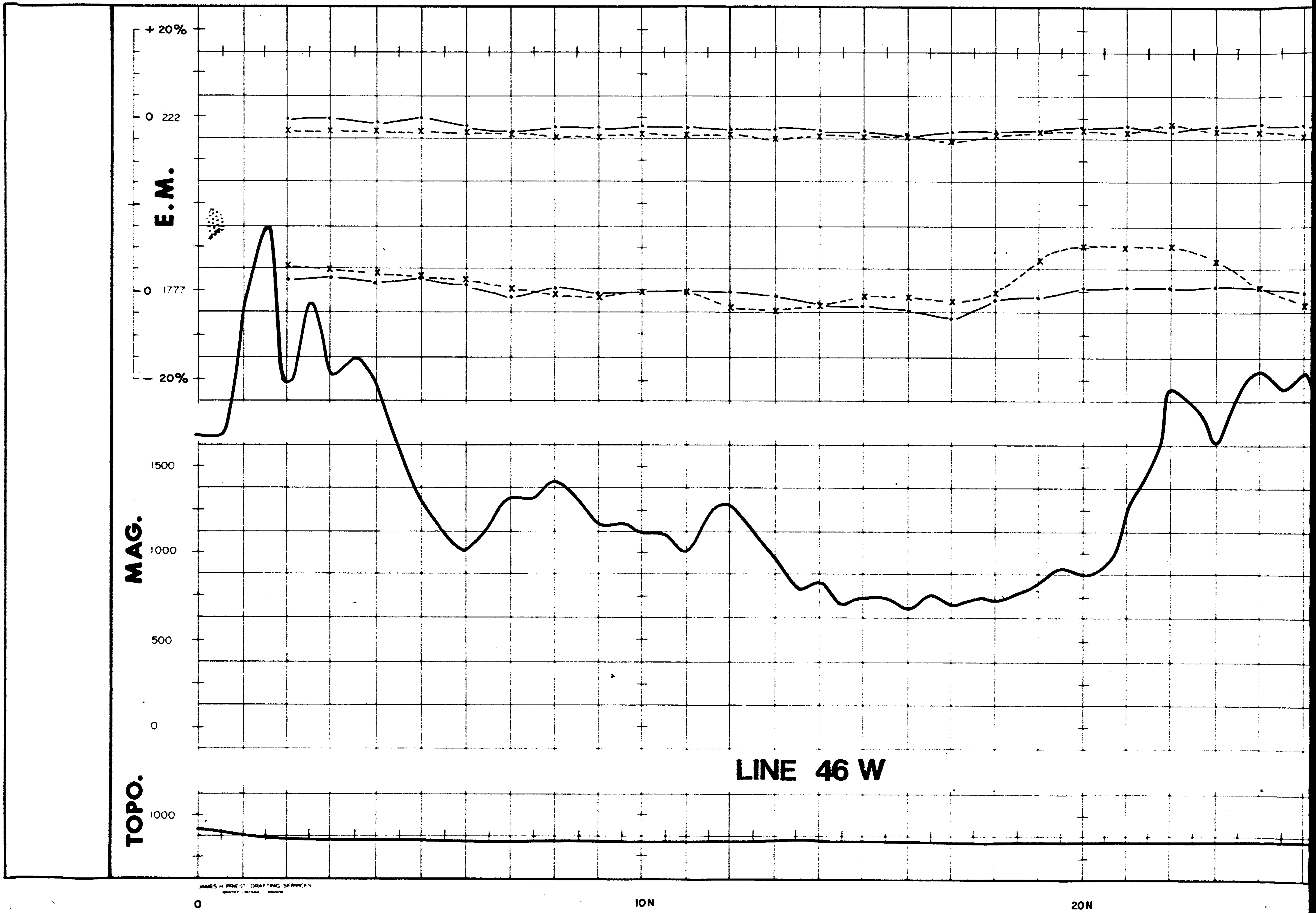
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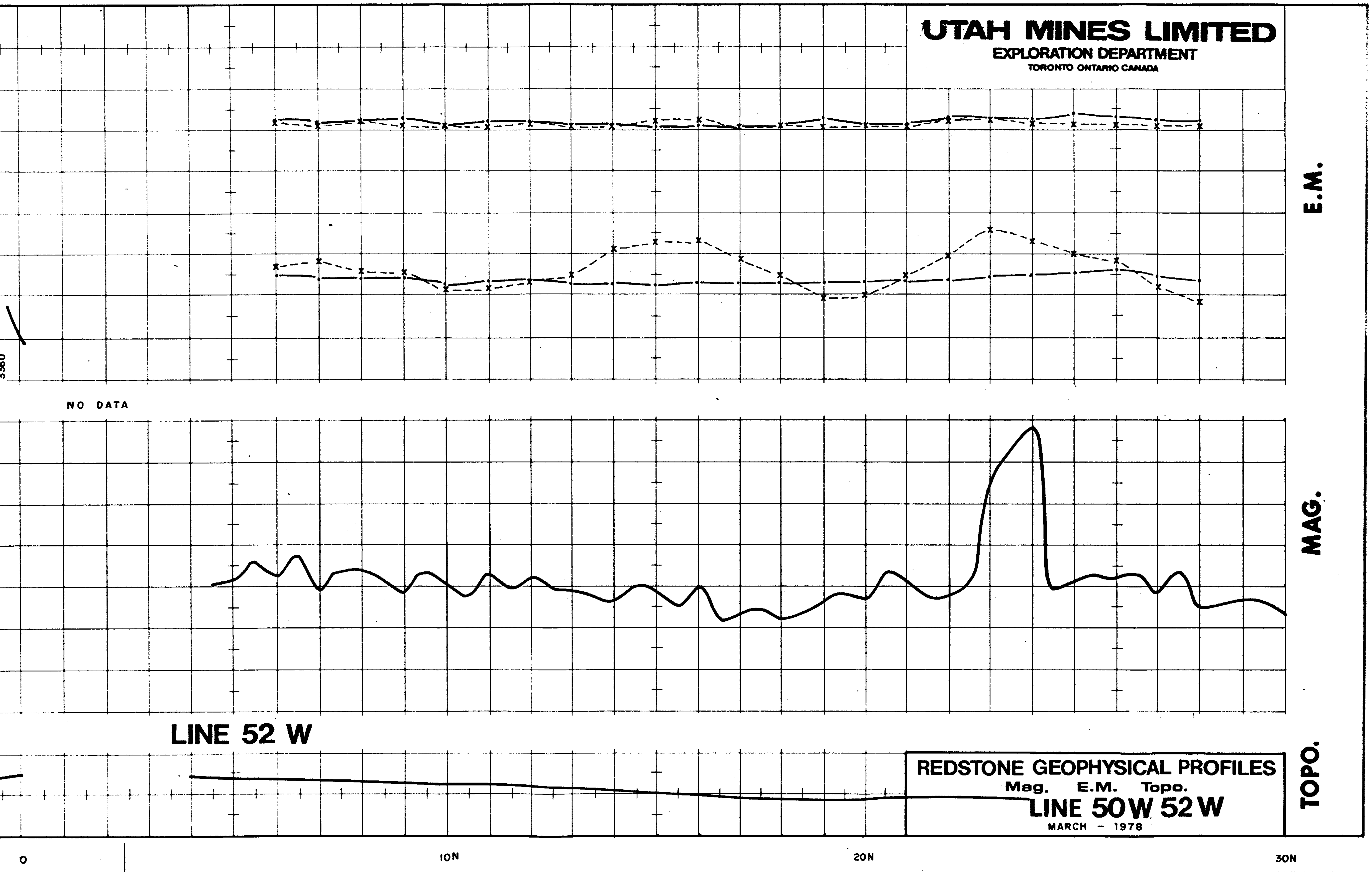
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
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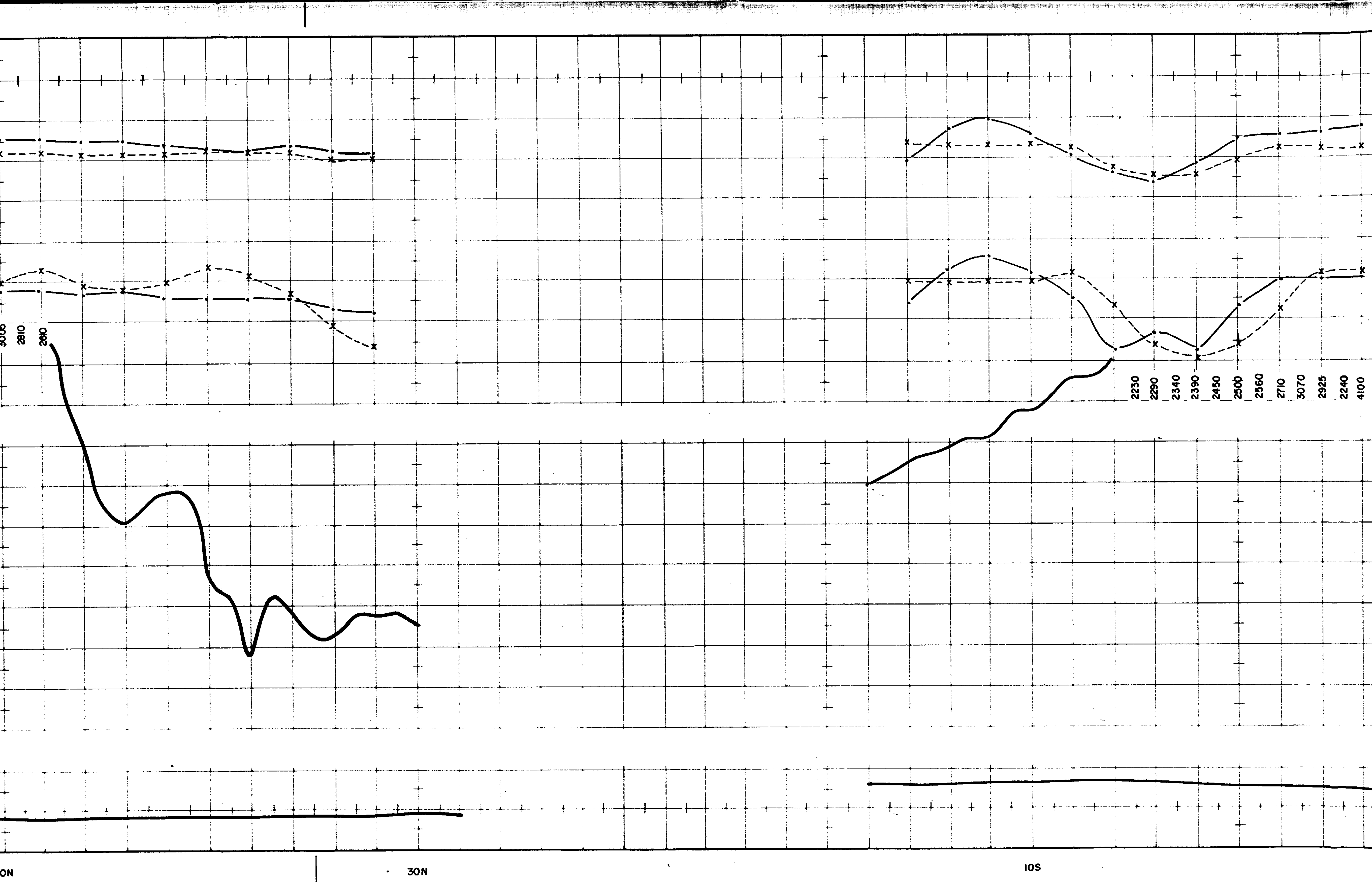
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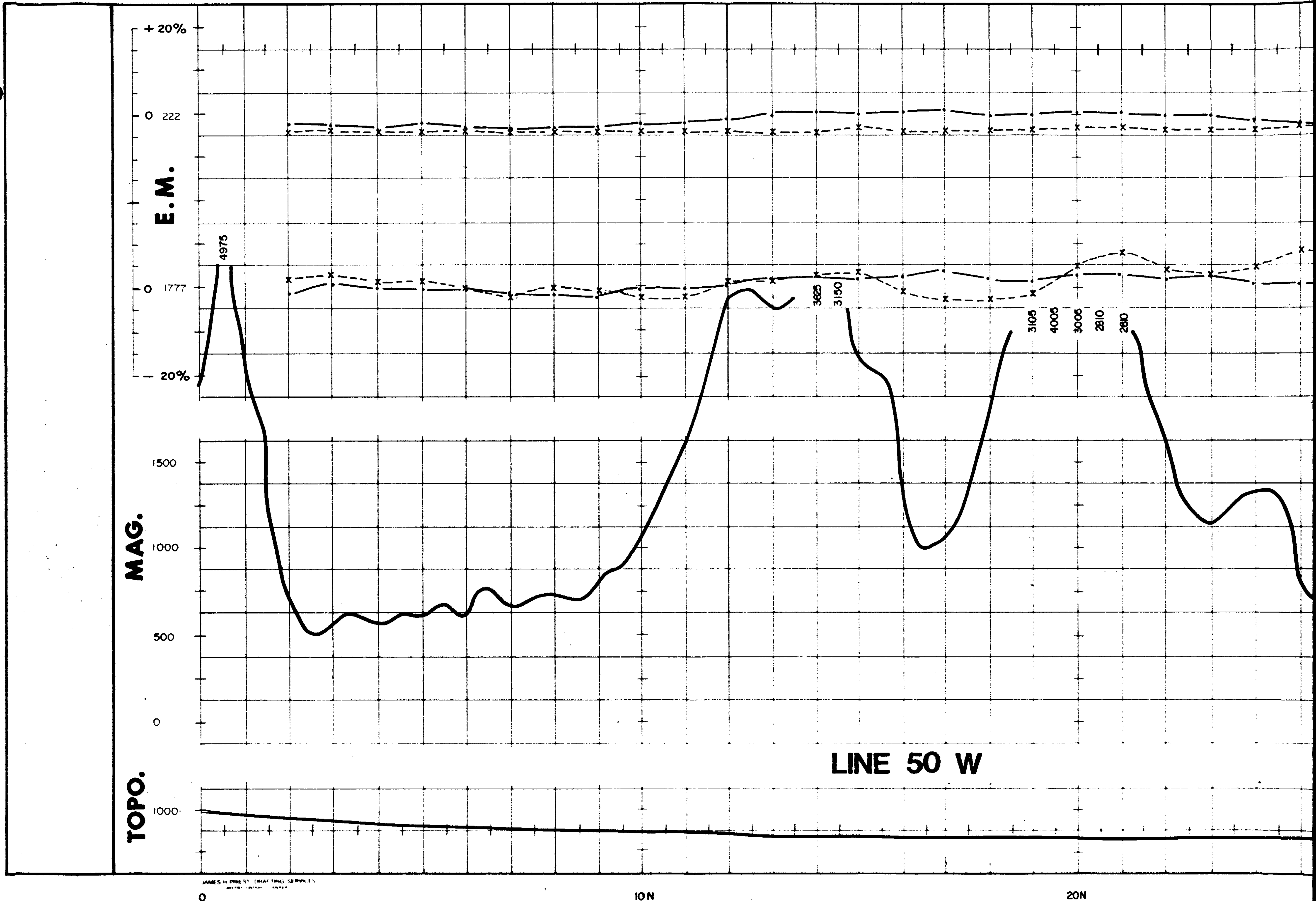

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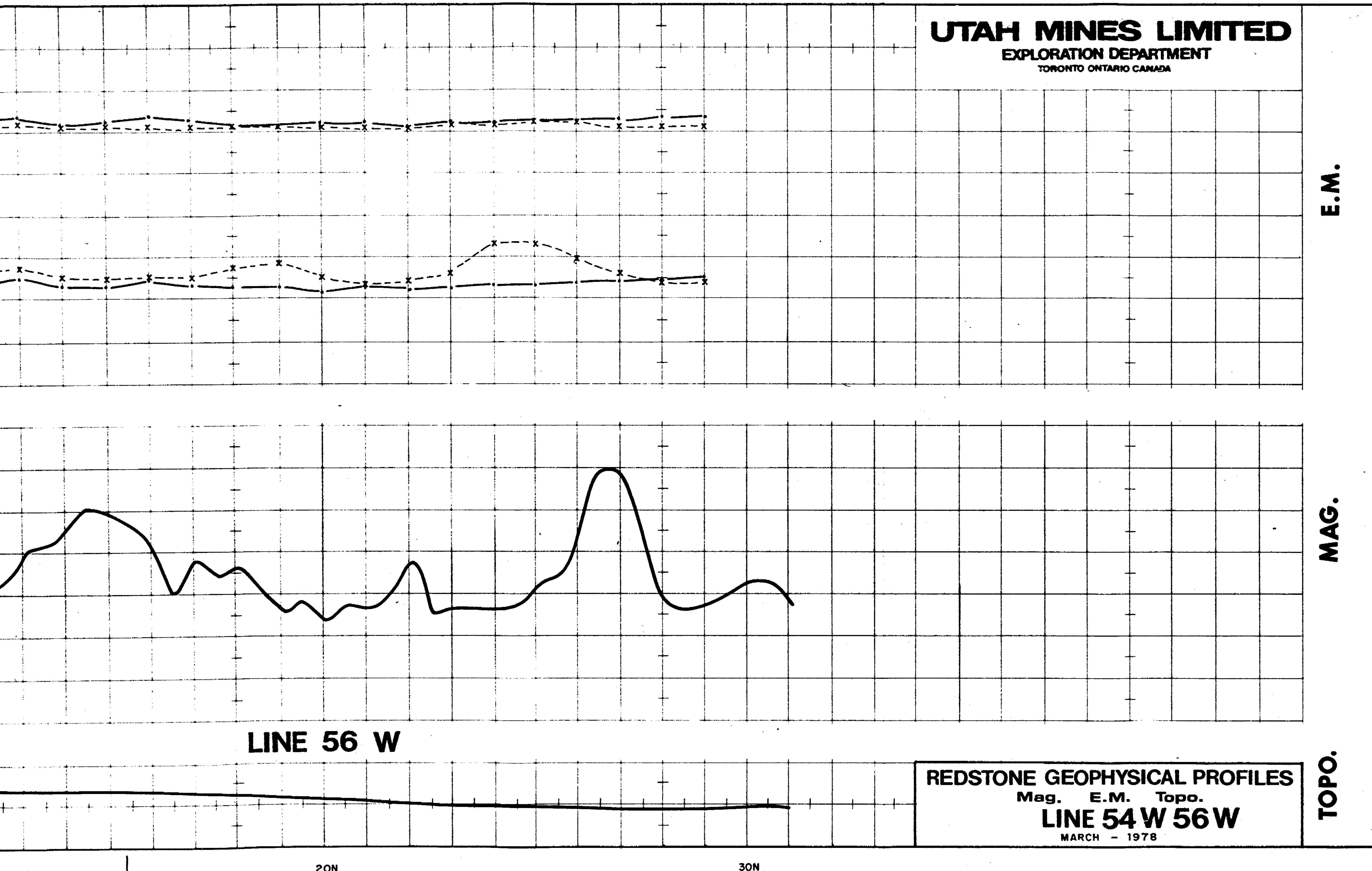

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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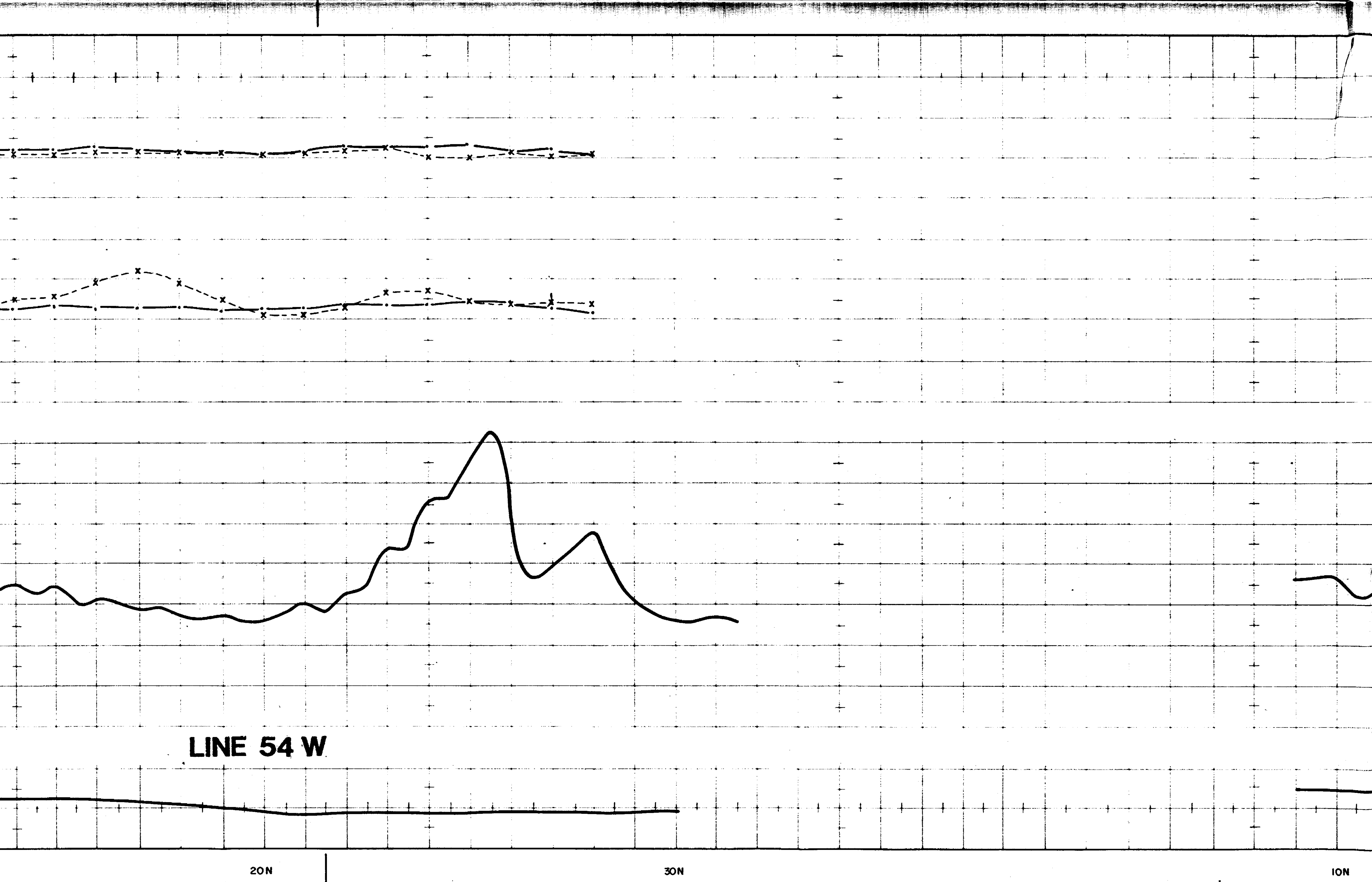
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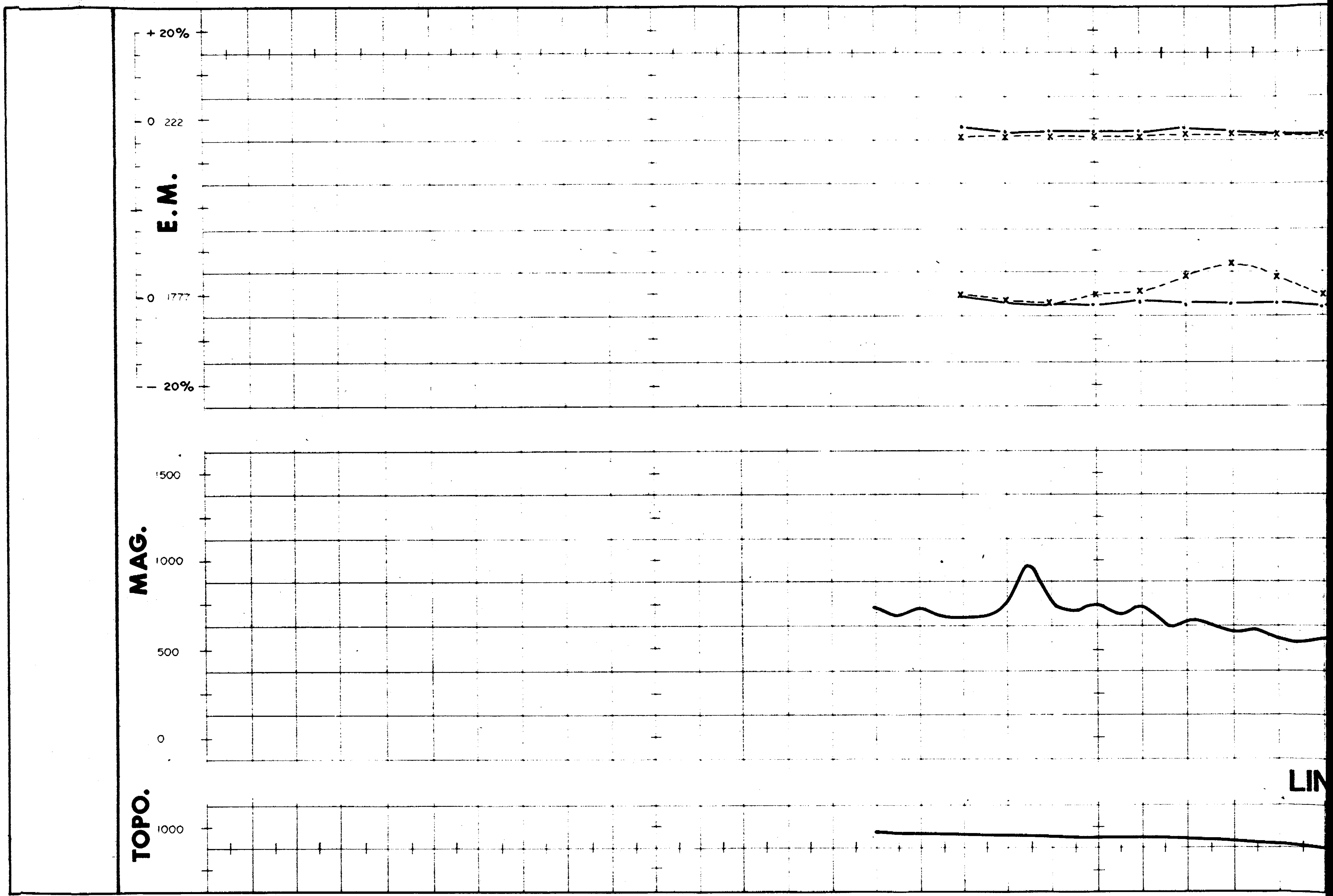

JAMES H. PRIEST DRAFTING SERVICES

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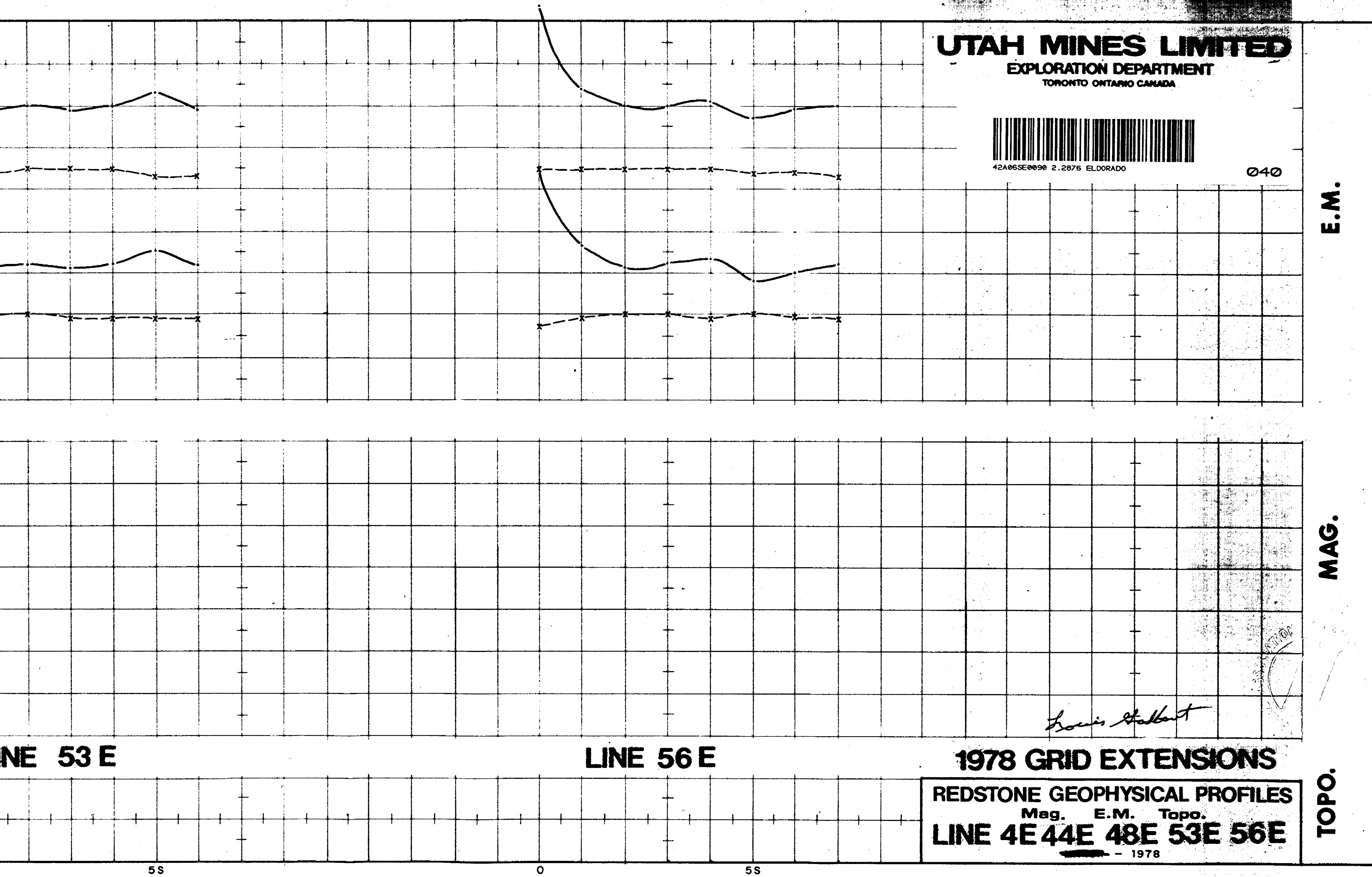
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EXPLORATION DEPARTMENT
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1978 GRID EXTENSIONS
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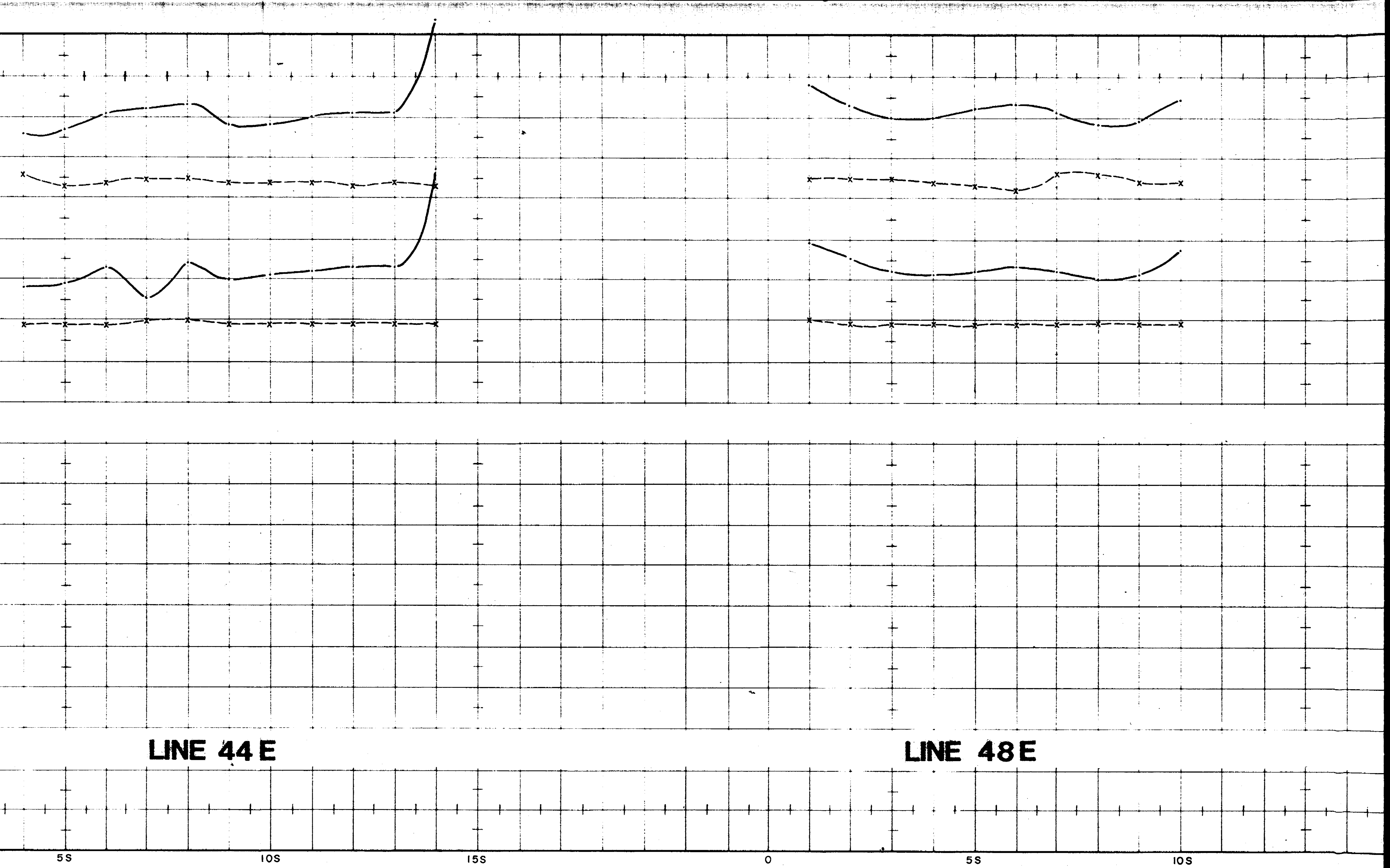

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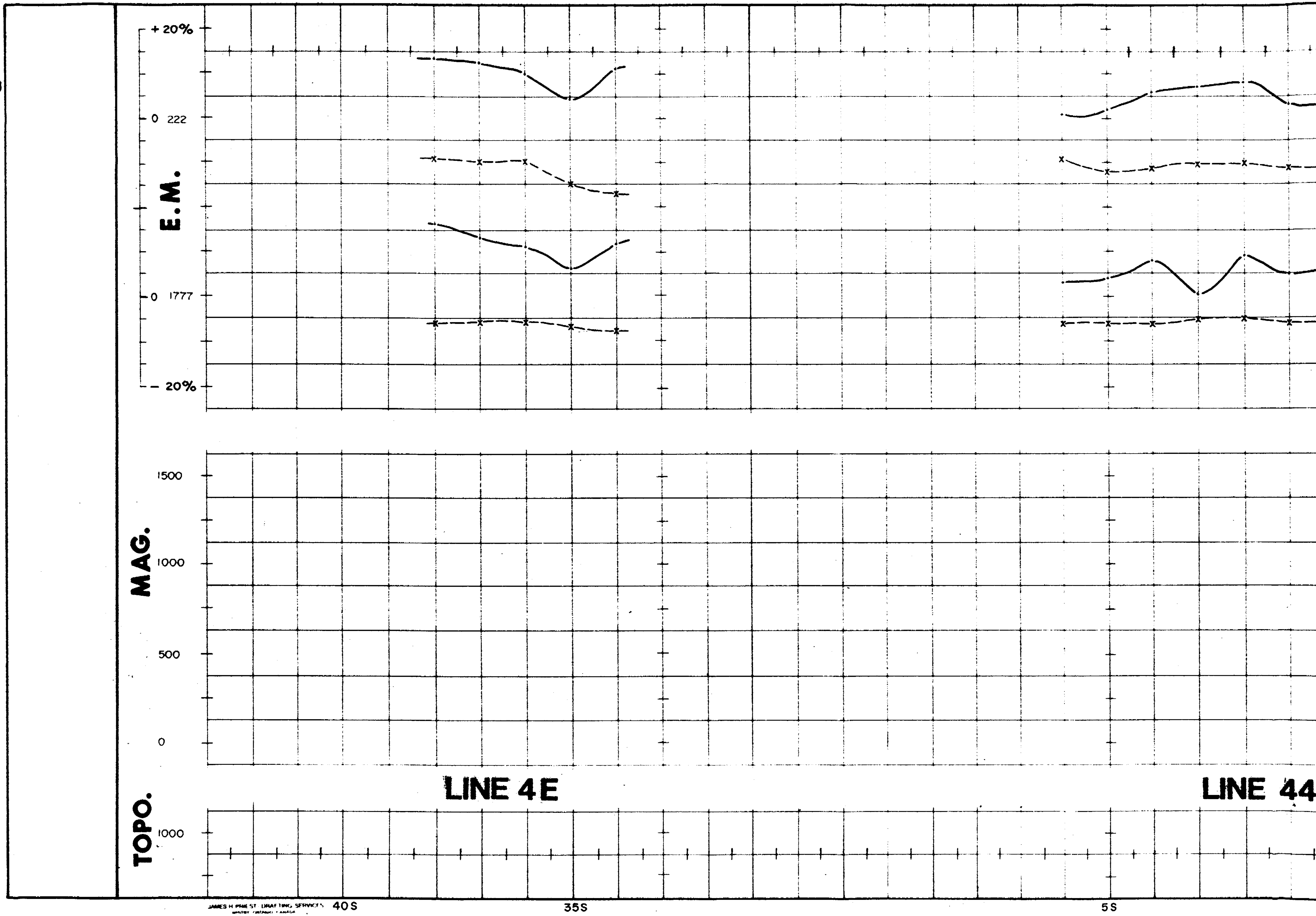

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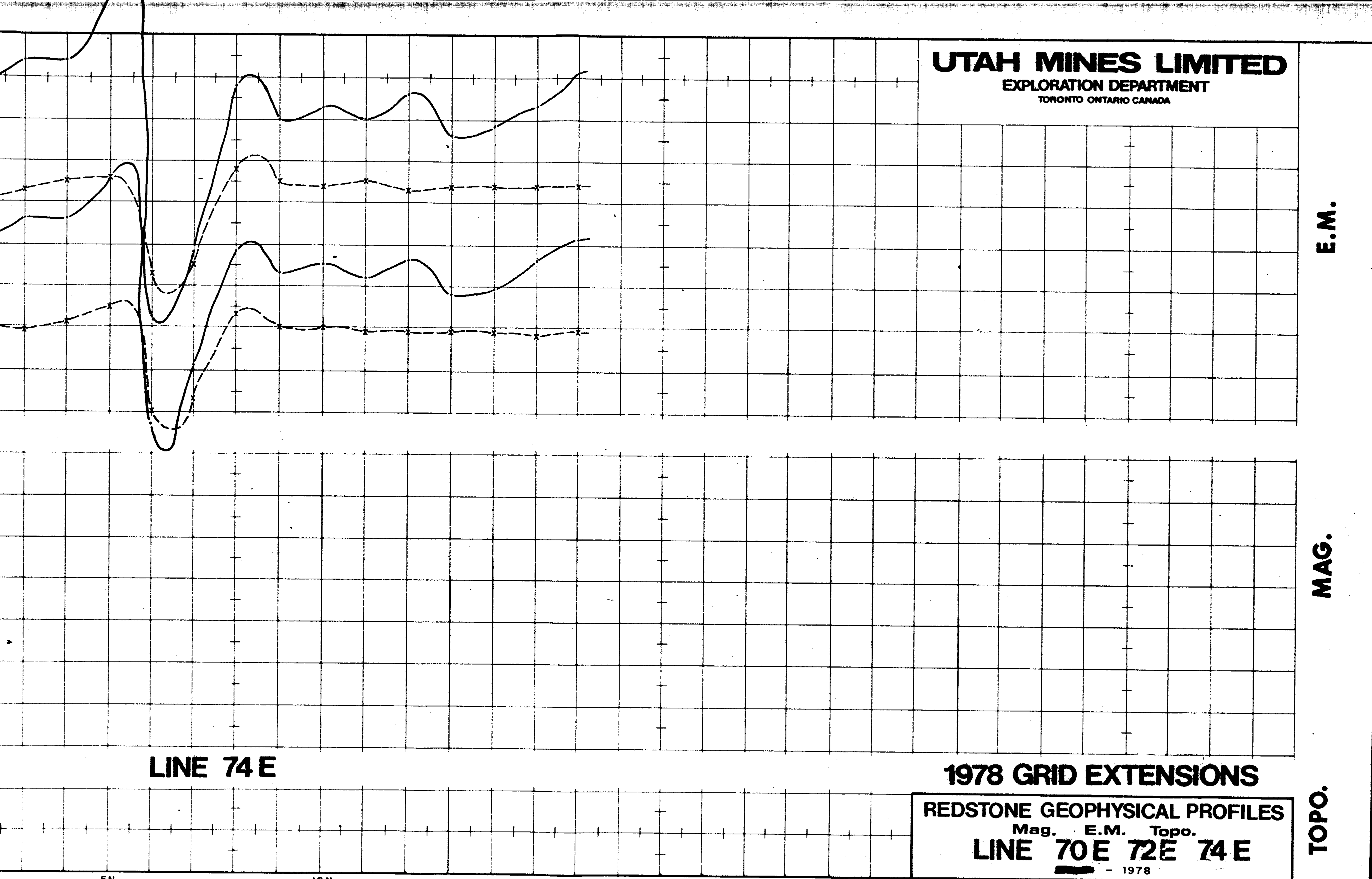

UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA

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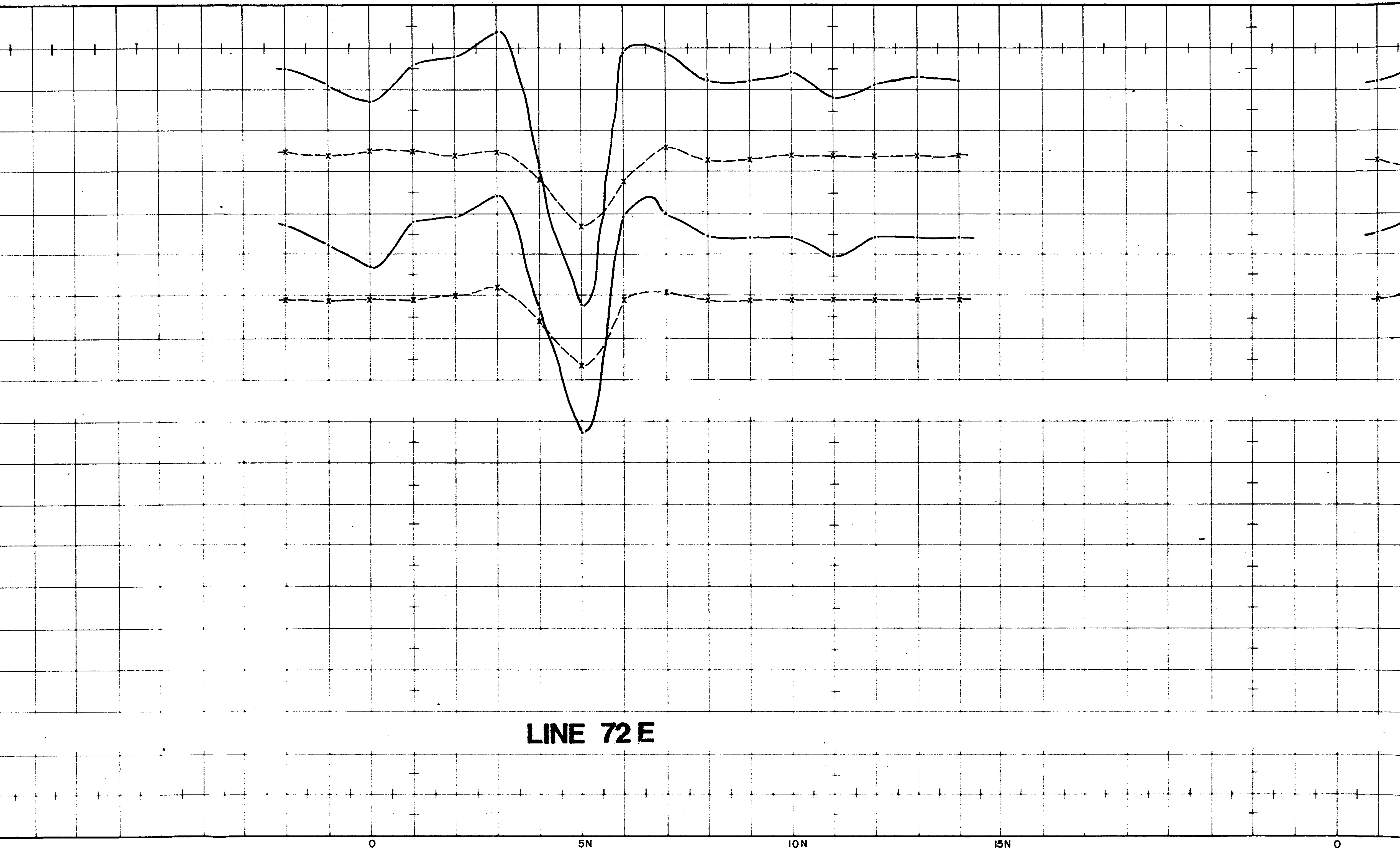

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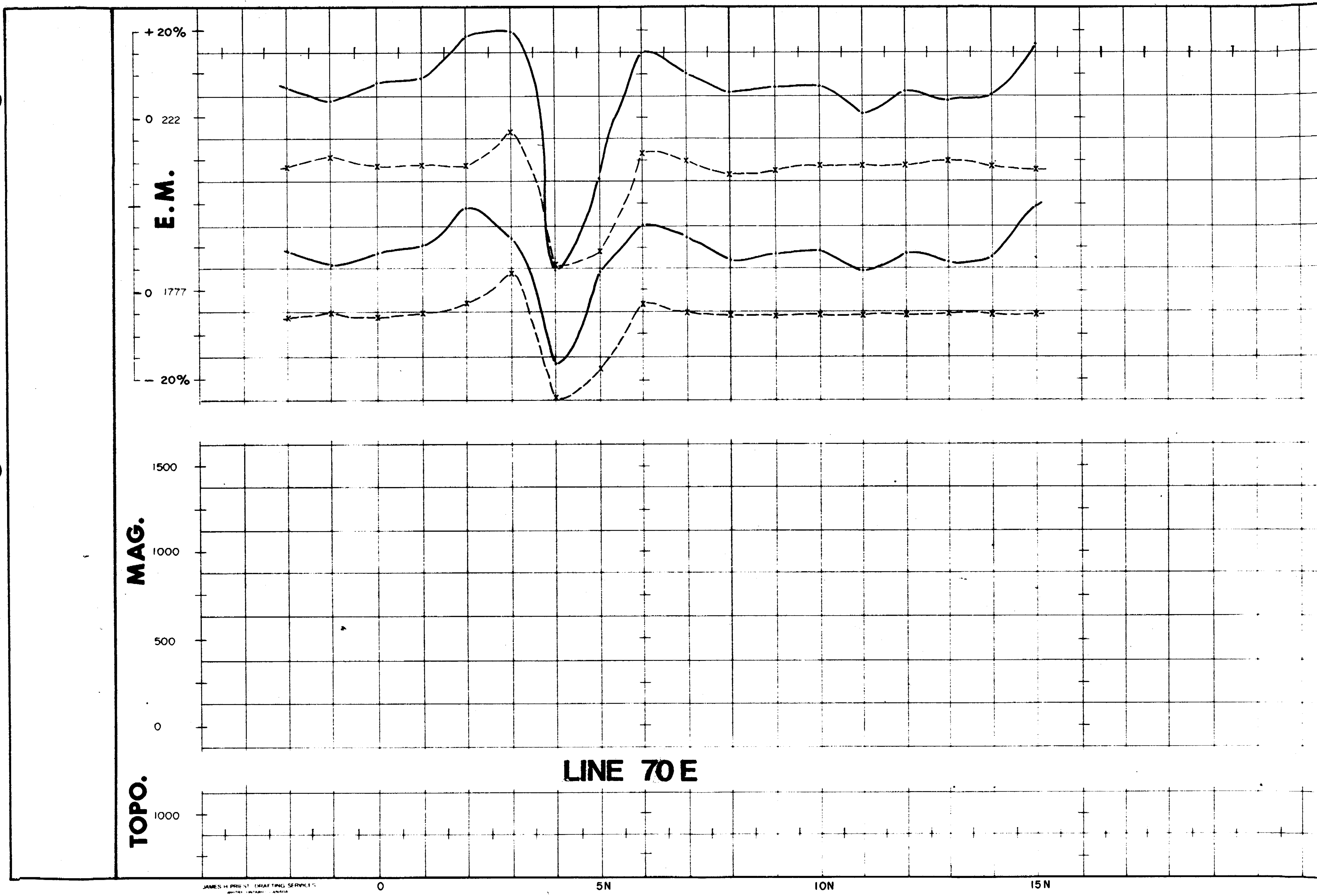
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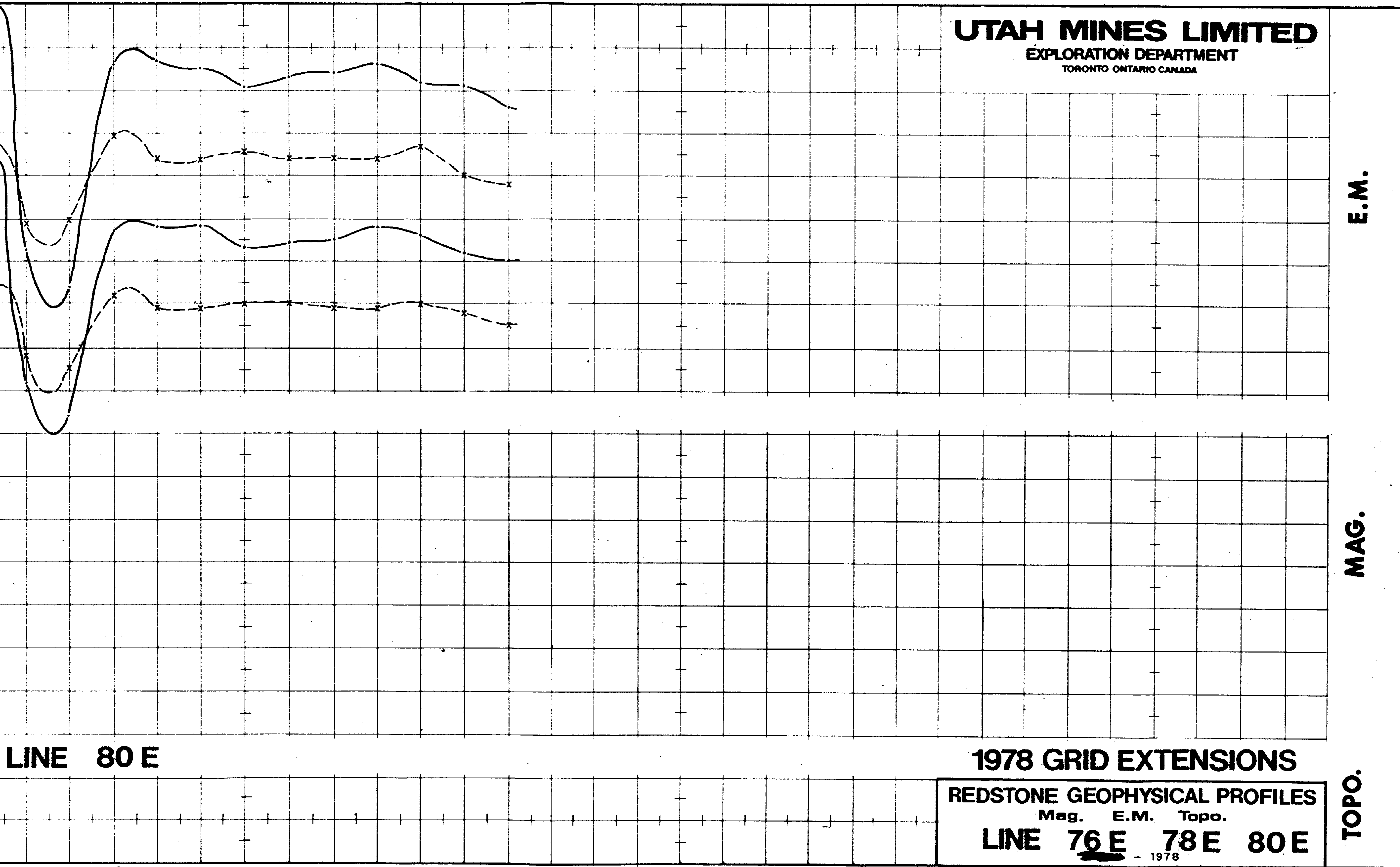
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA



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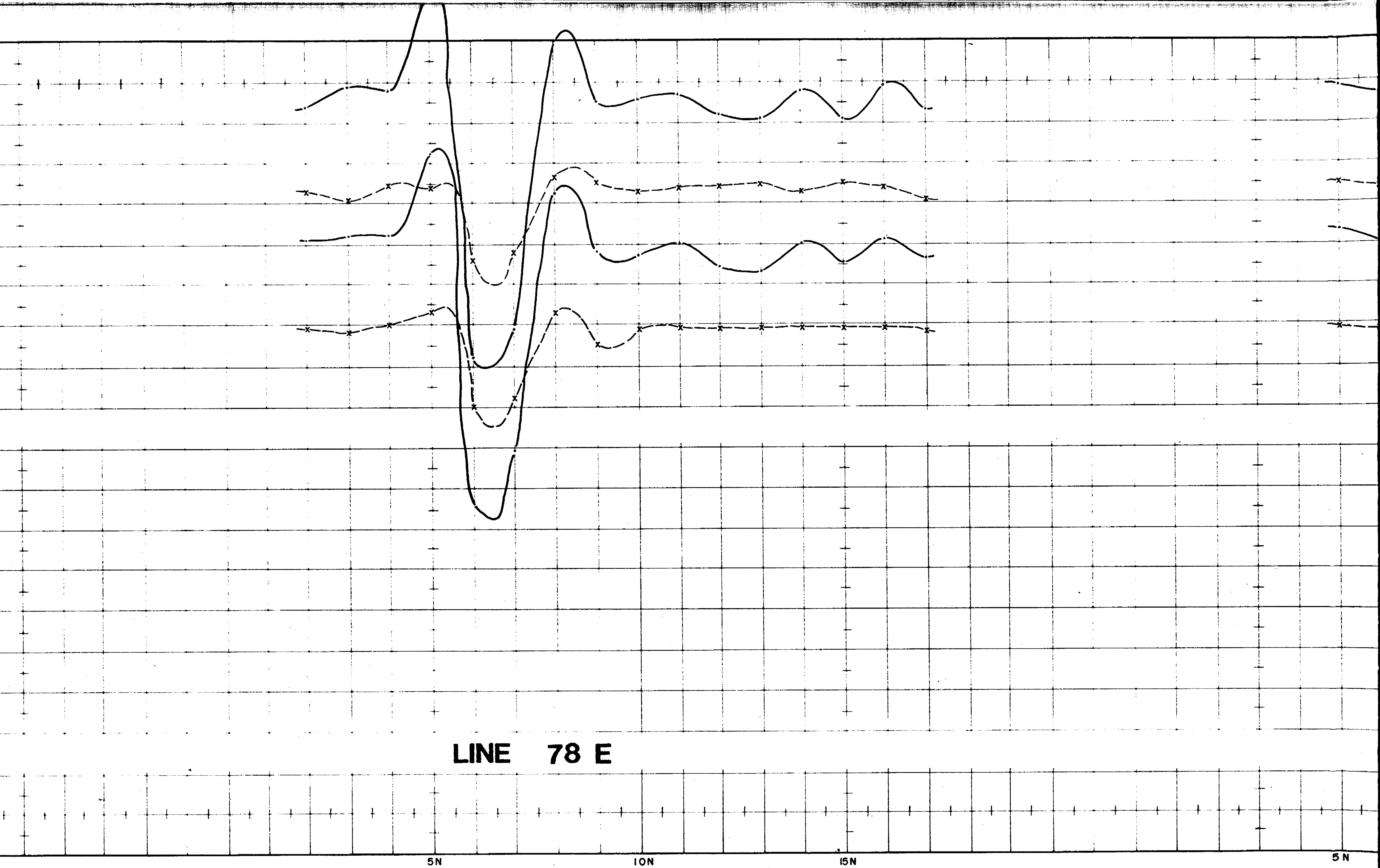
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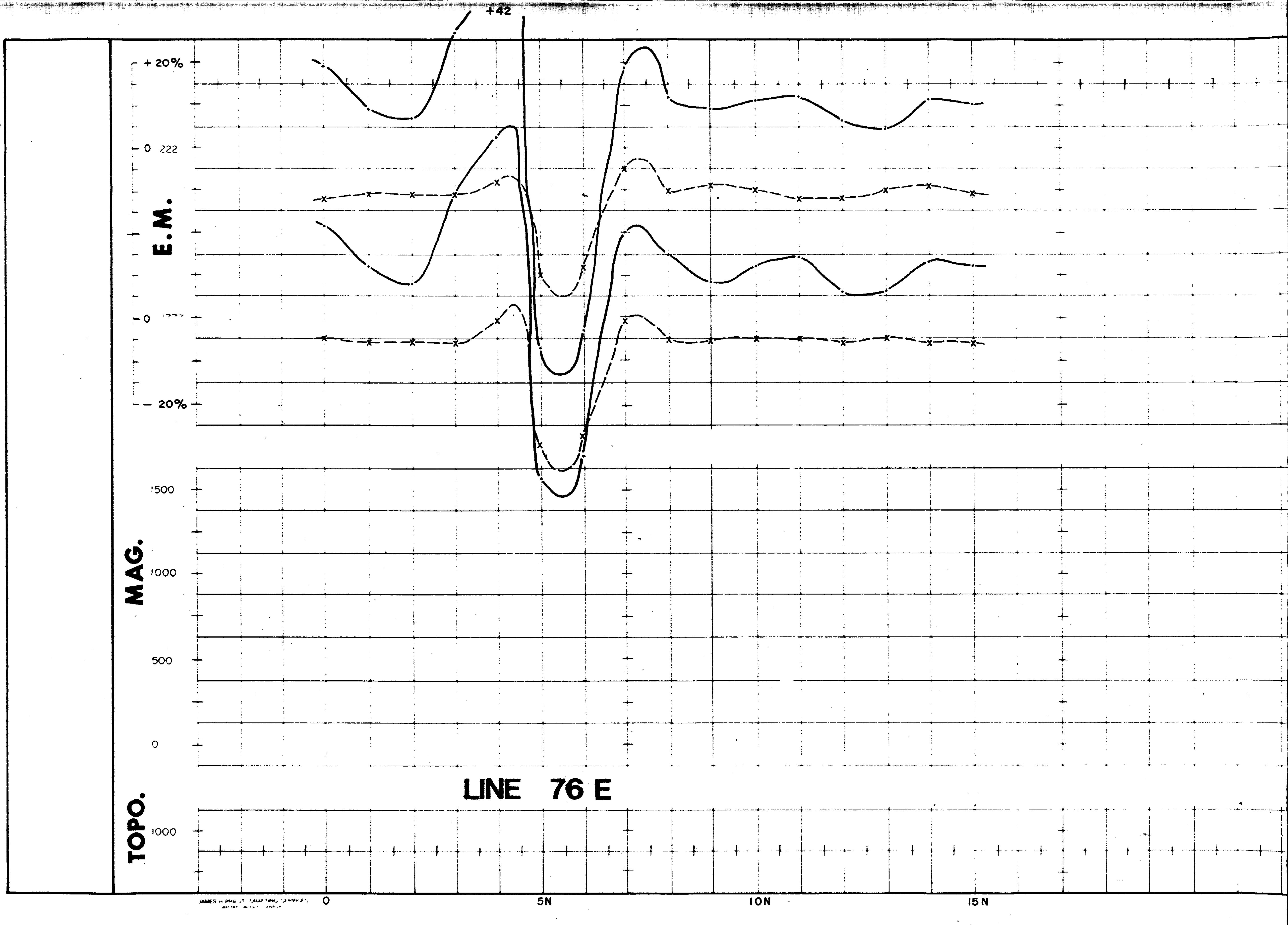

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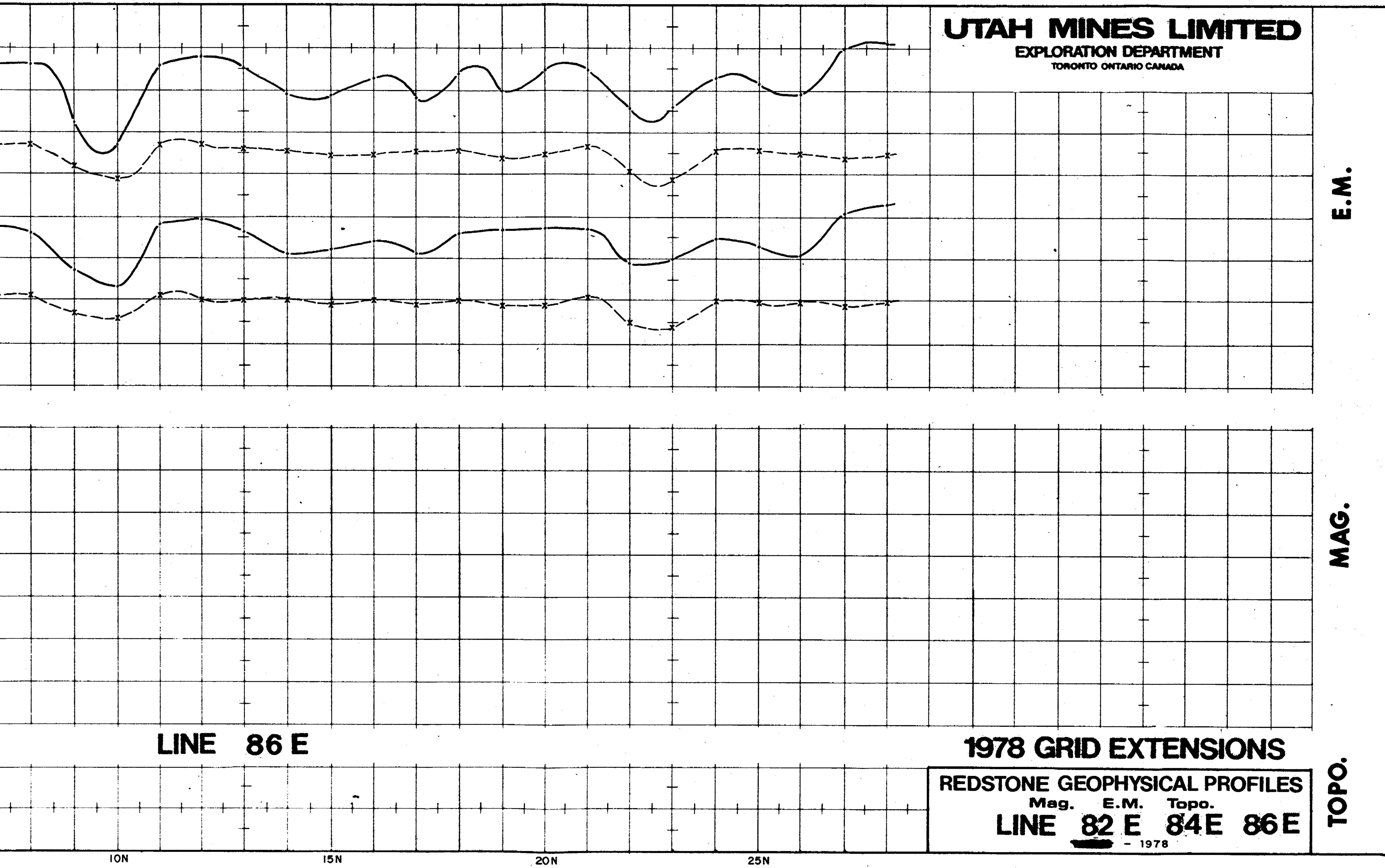

UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA

1978 GRID EXTENSIONS

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Mag. E.M. Topo.

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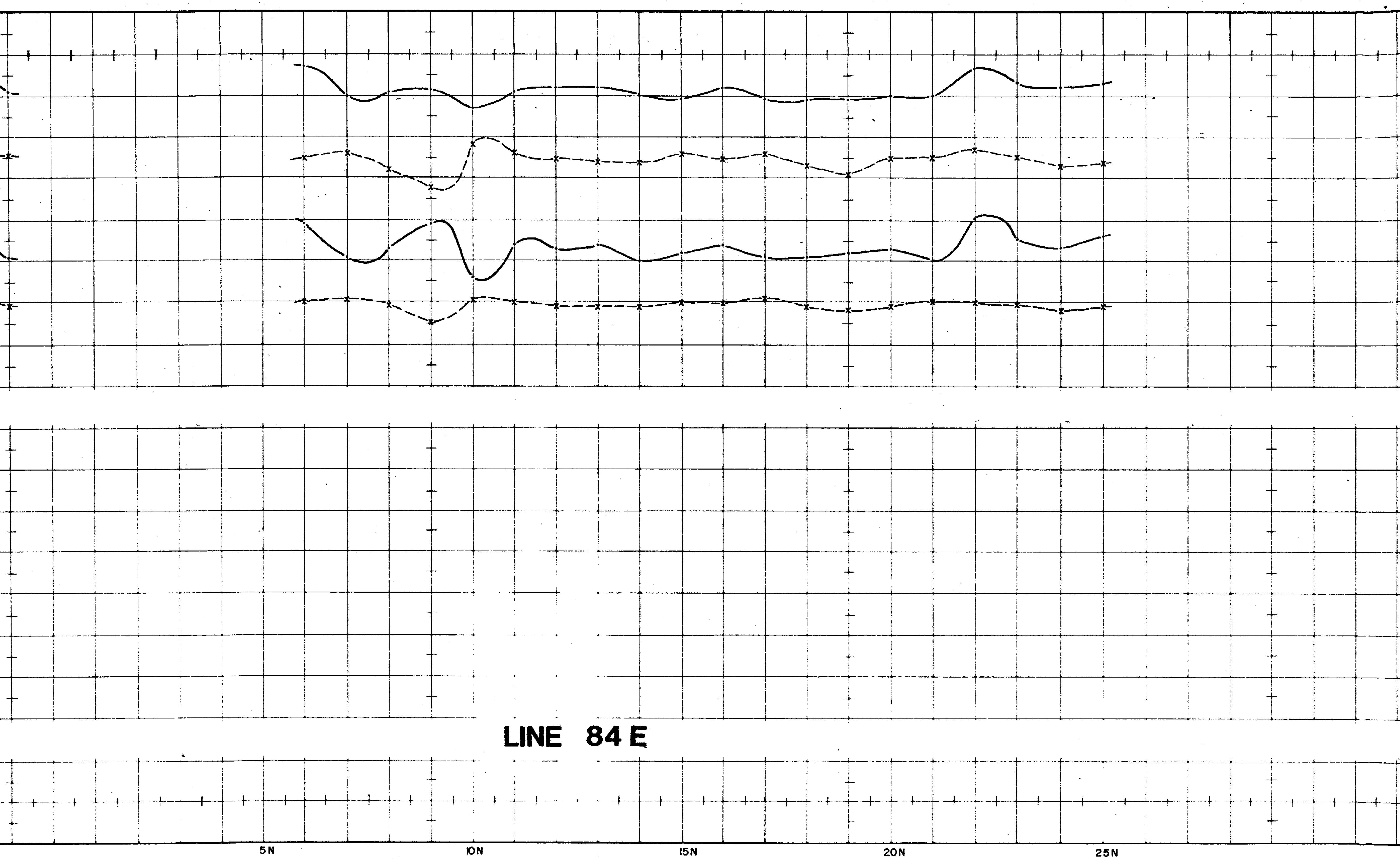
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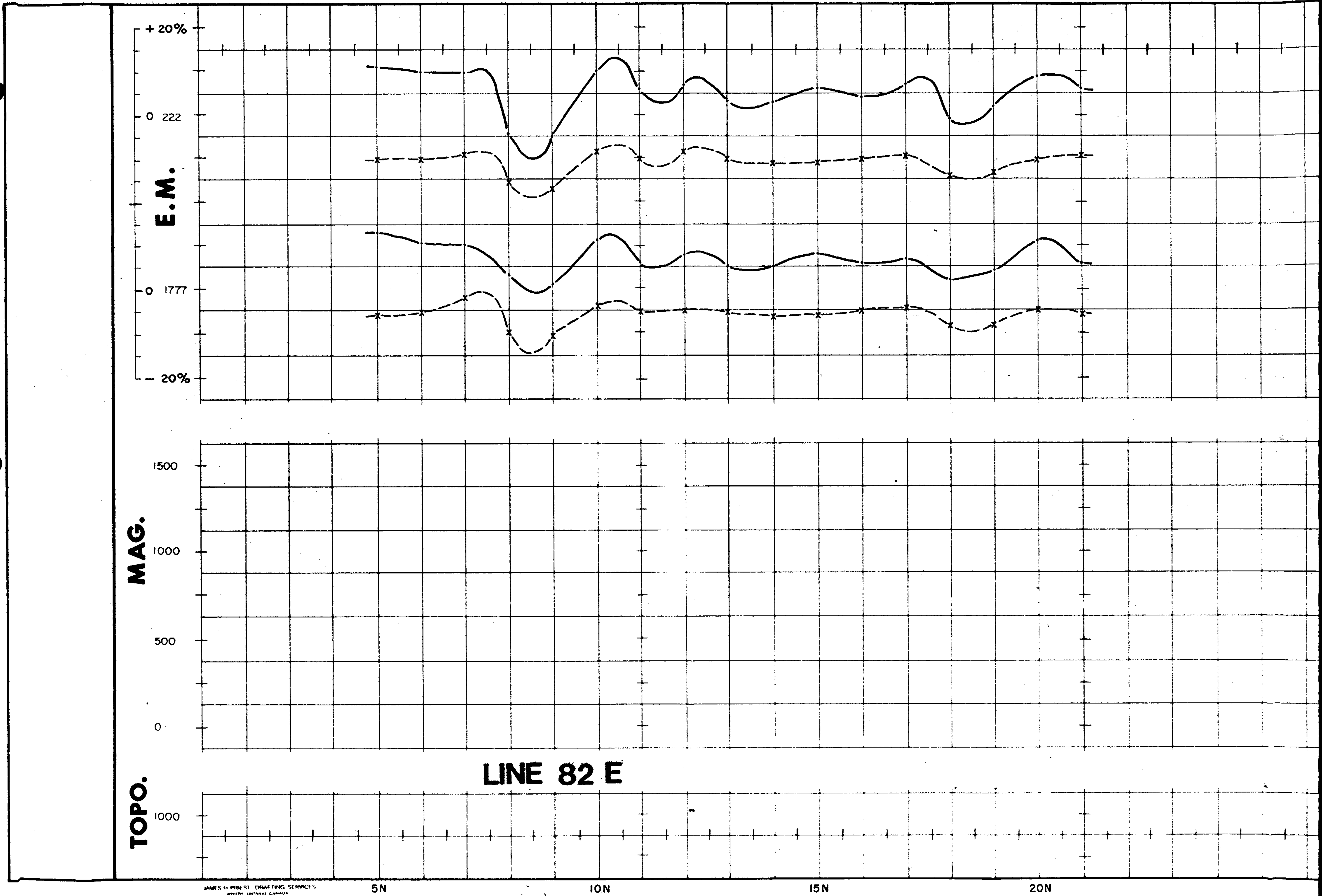

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UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA

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1978 GRID EXTENSIONS

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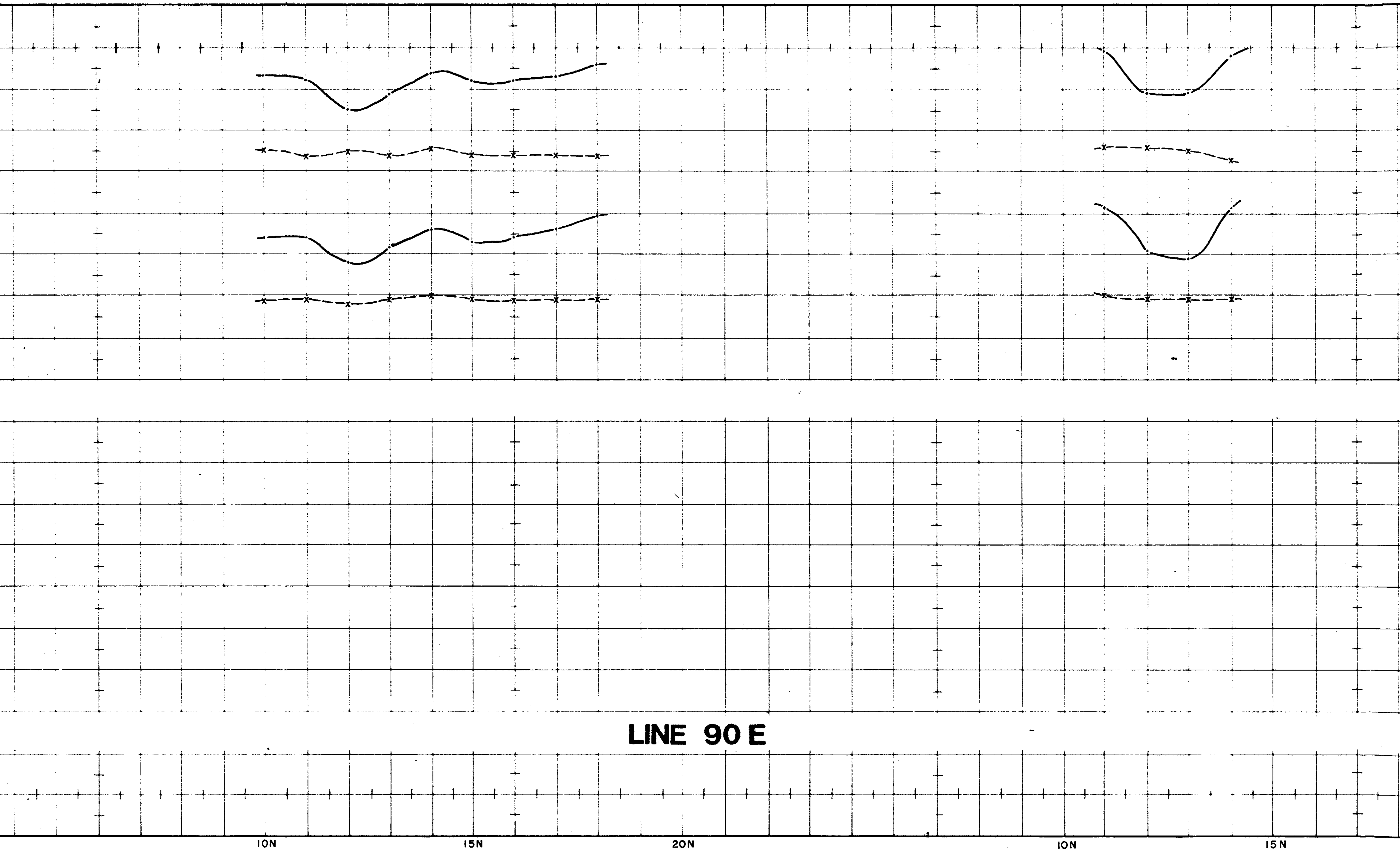
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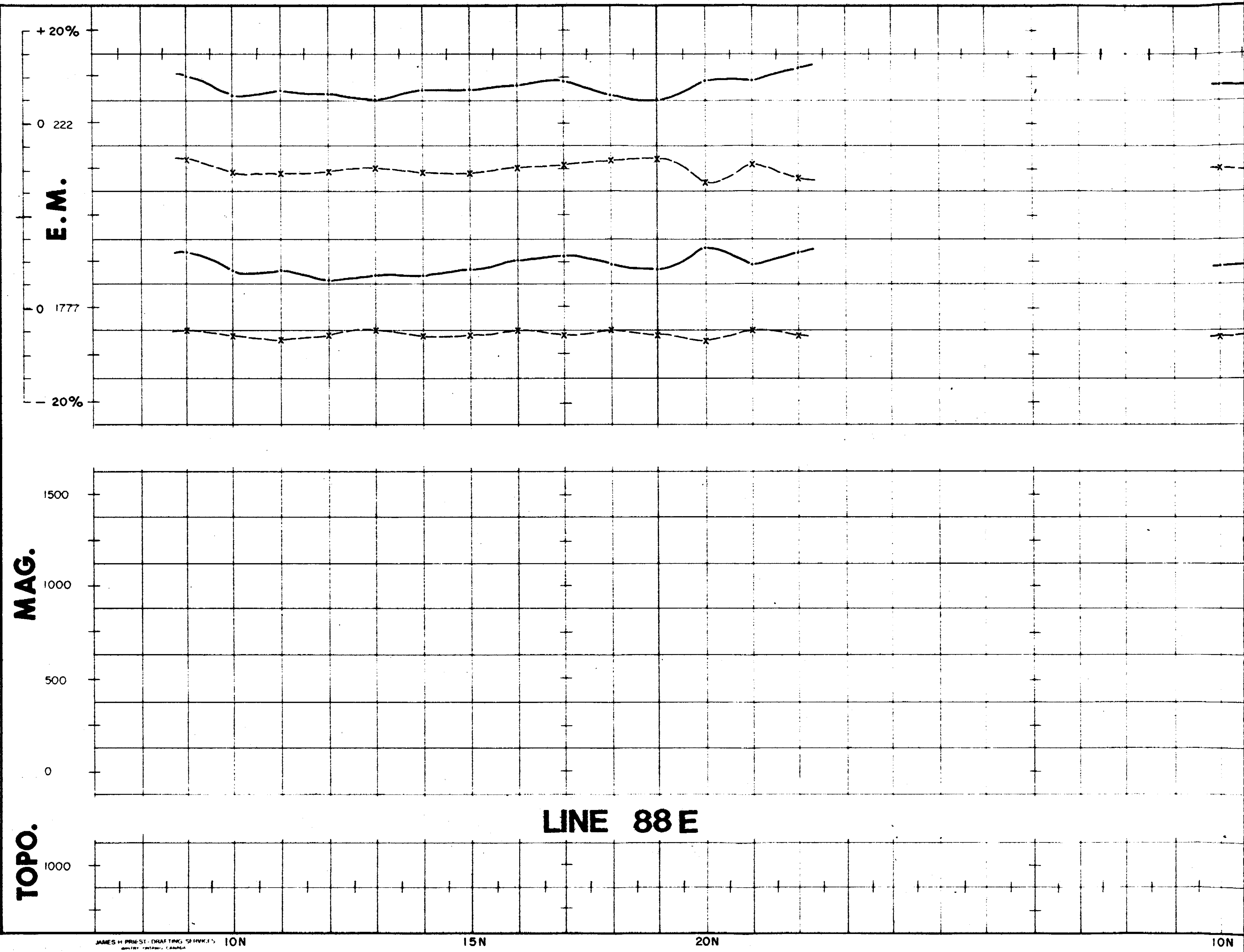
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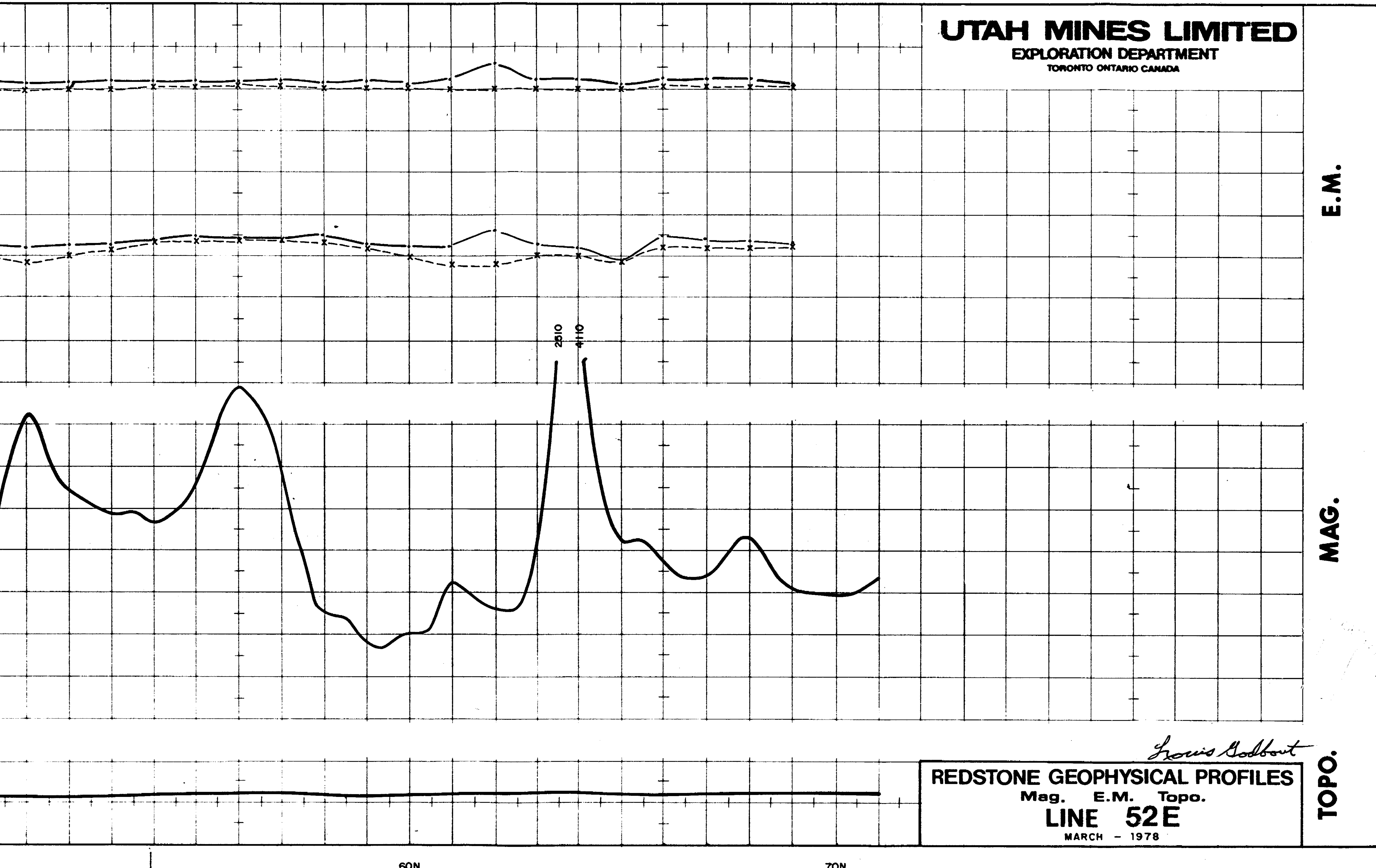
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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Louis Godbout
REDSTONE GEOPHYSICAL PROFILES
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MARCH - 1978
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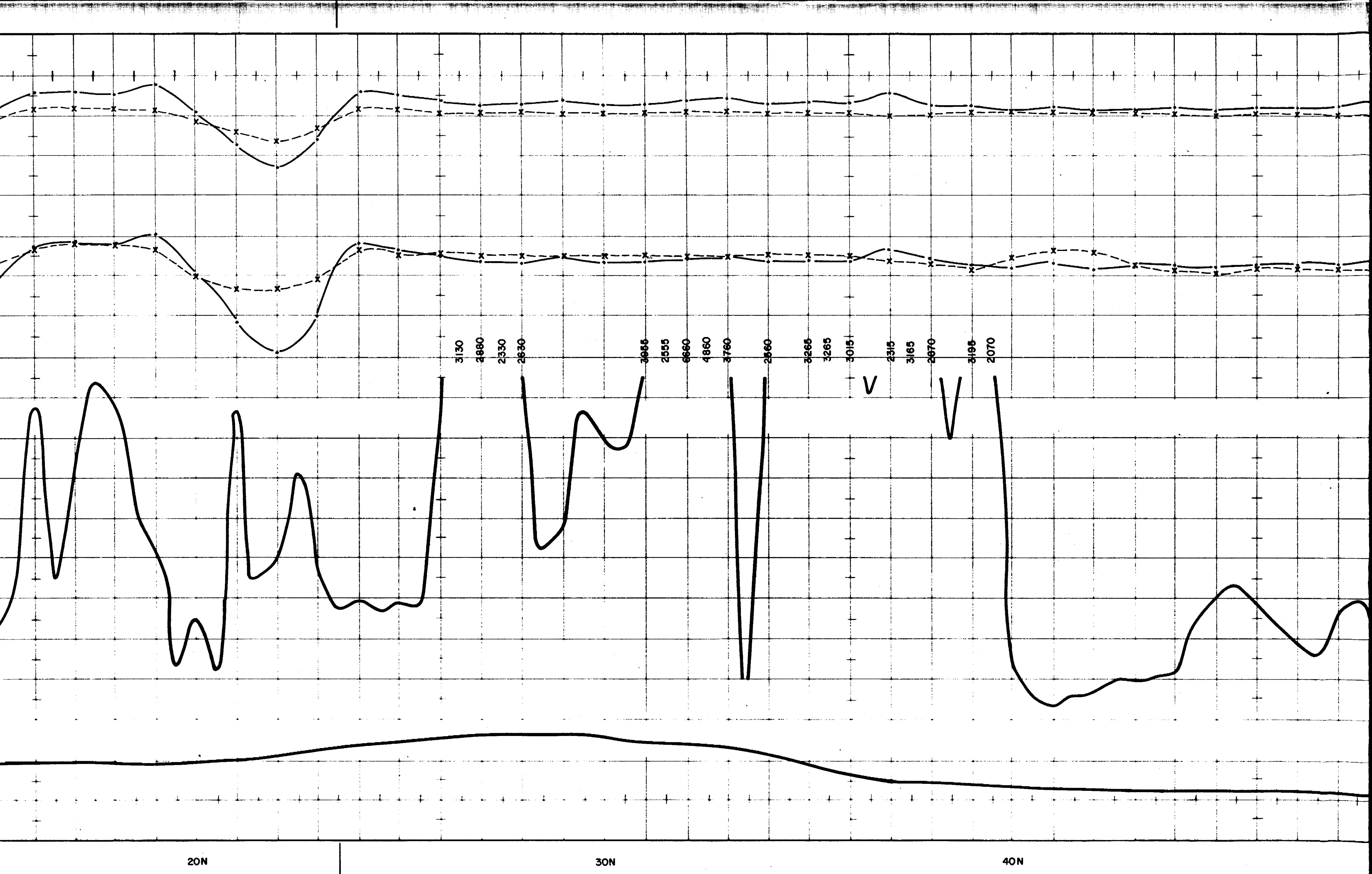
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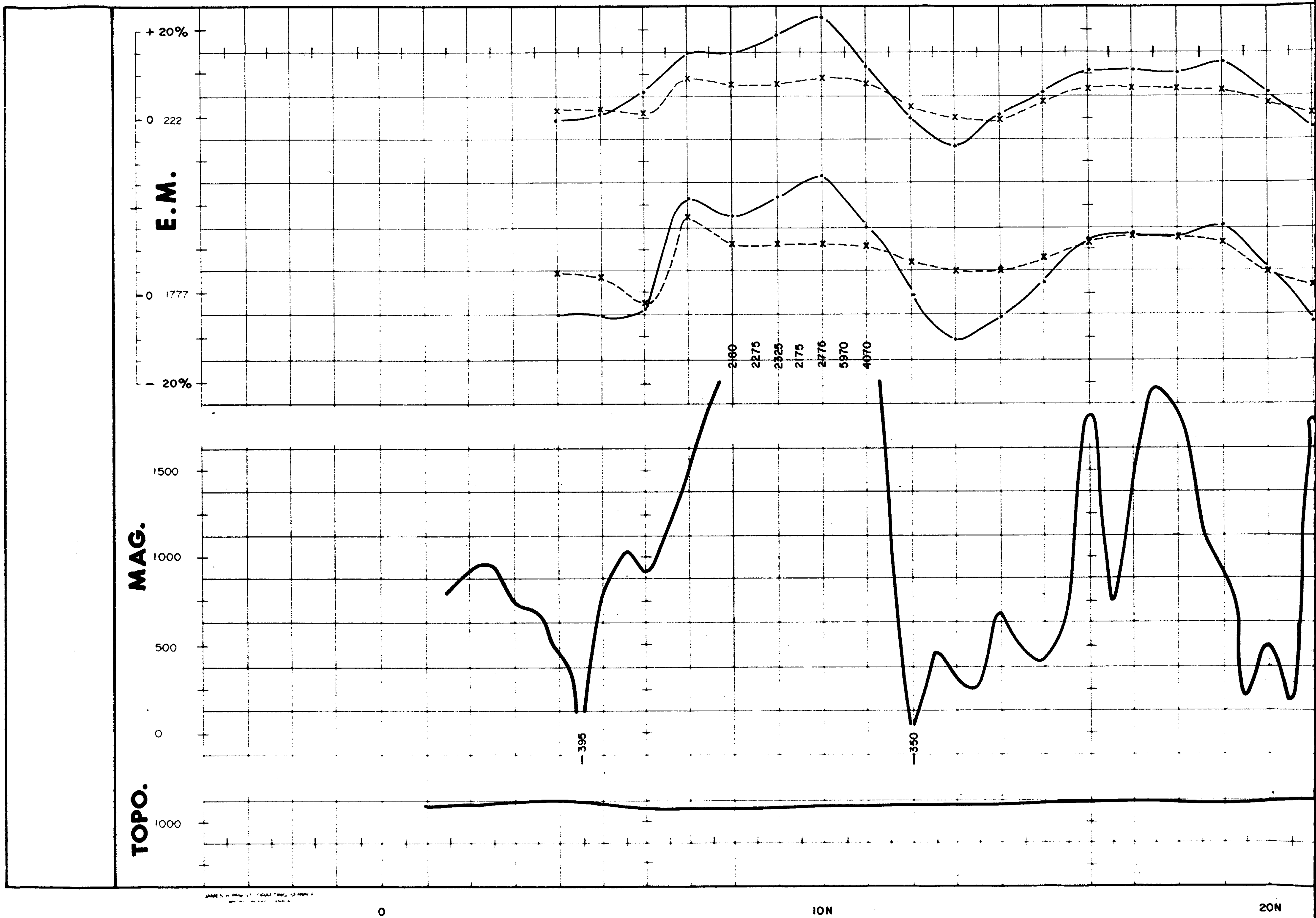

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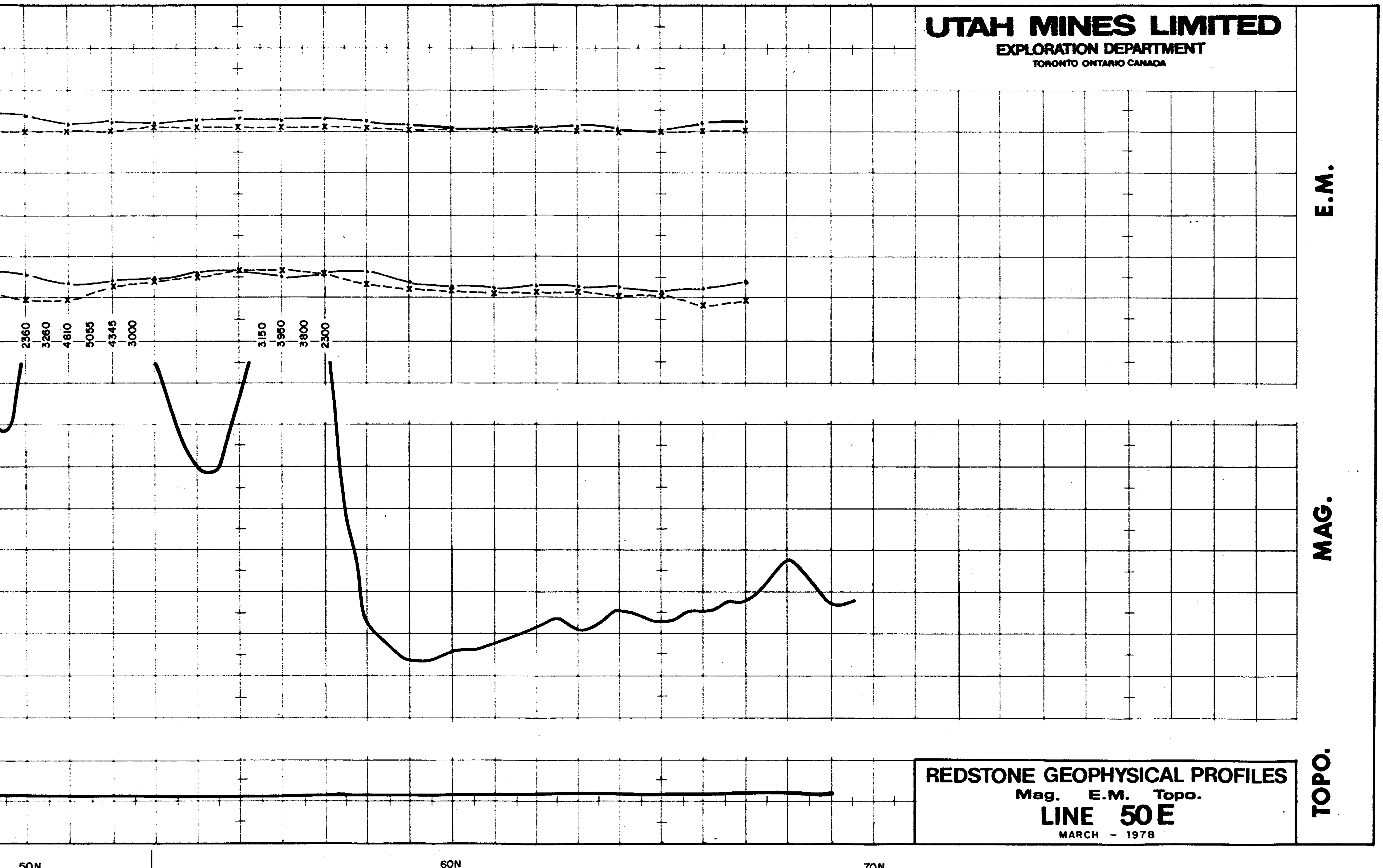

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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MARCH - 1978
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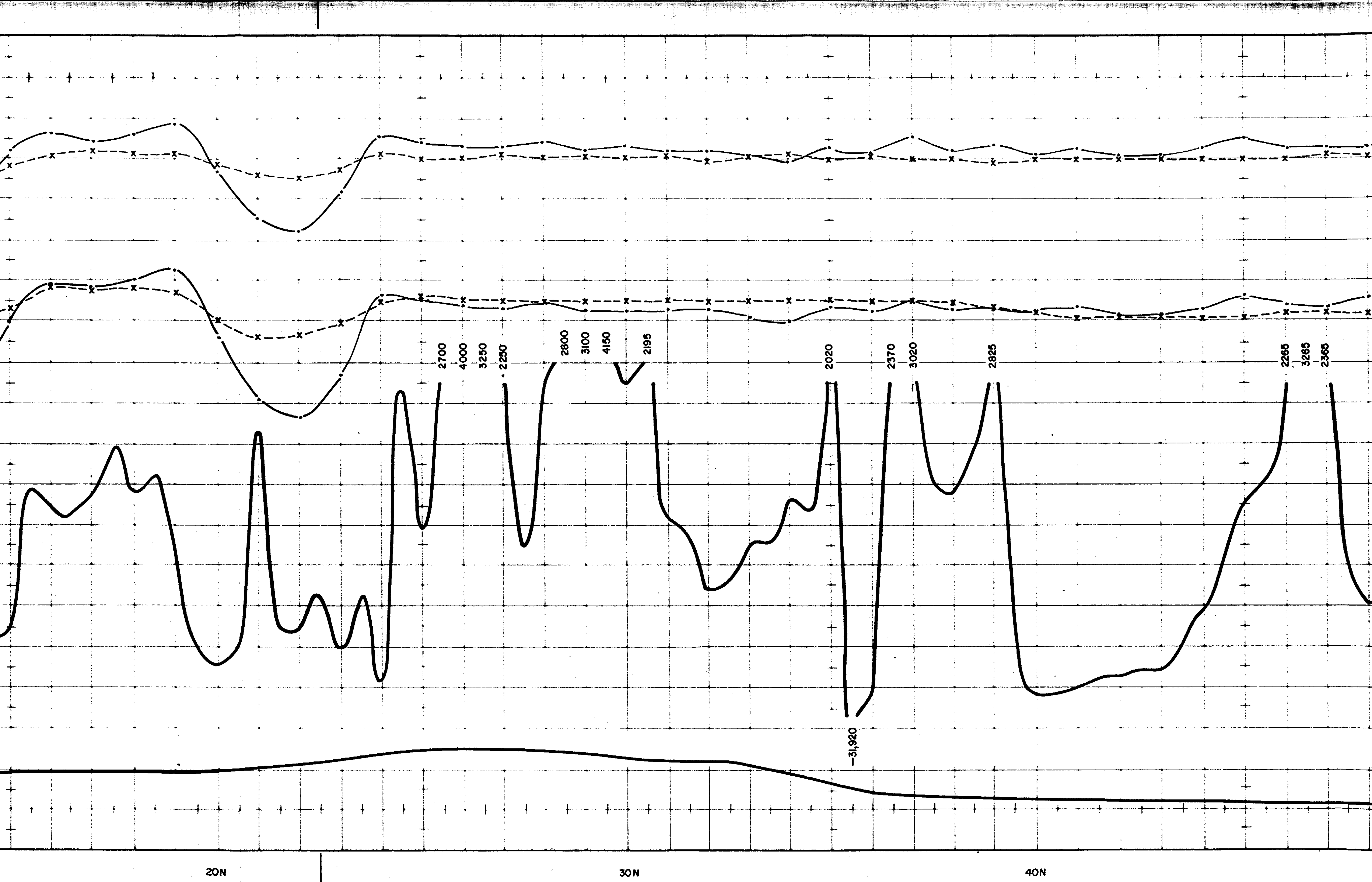
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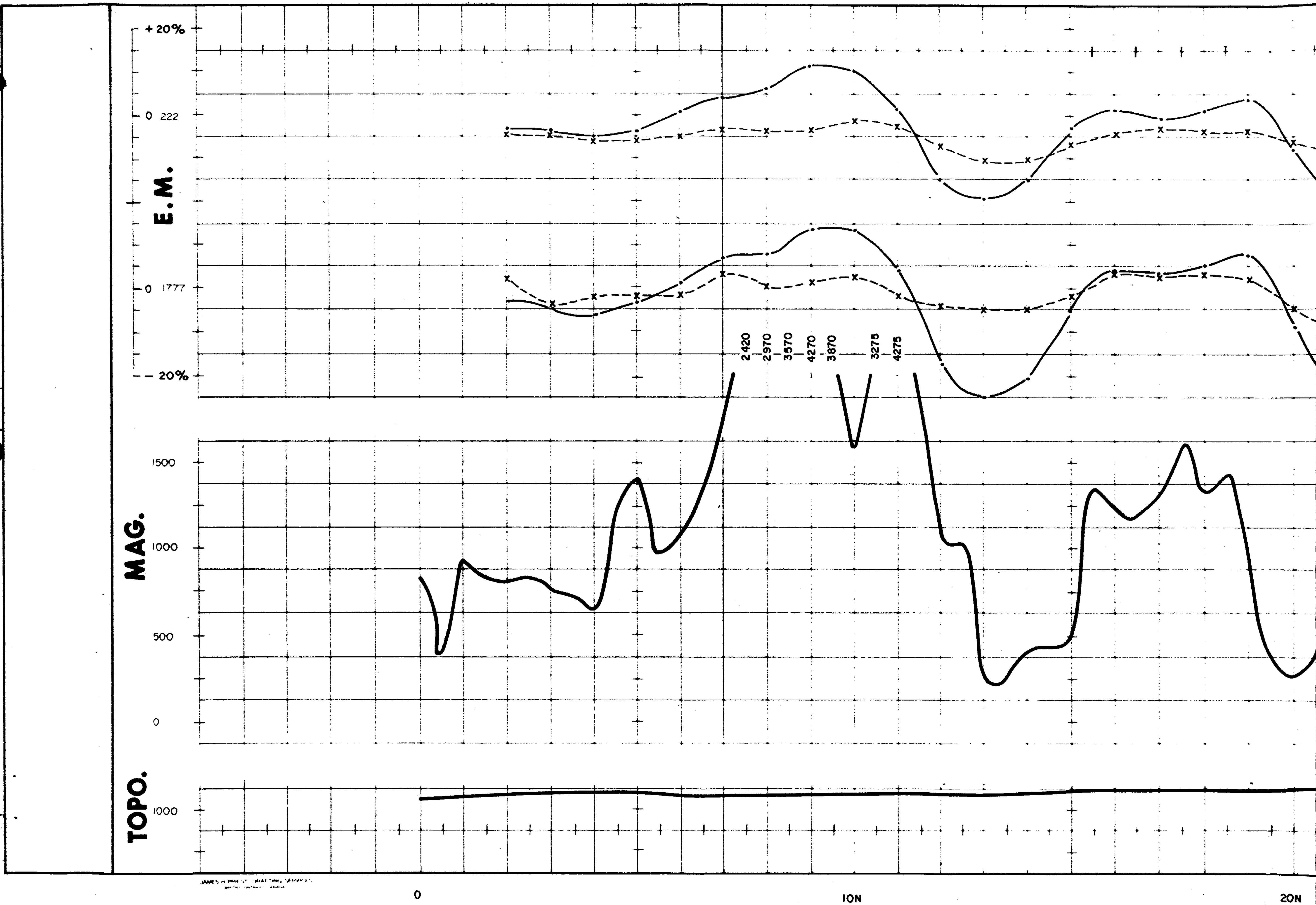
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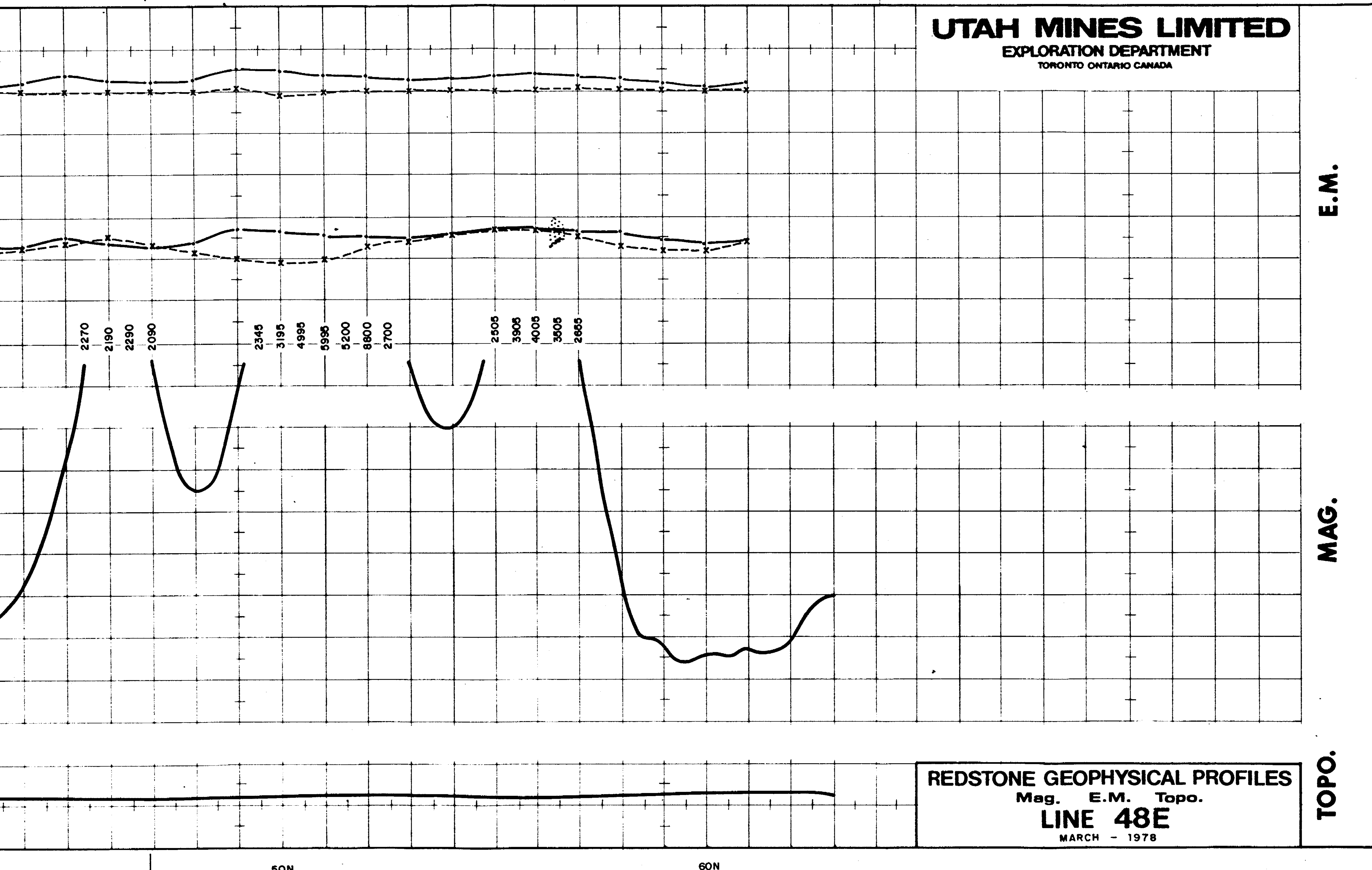
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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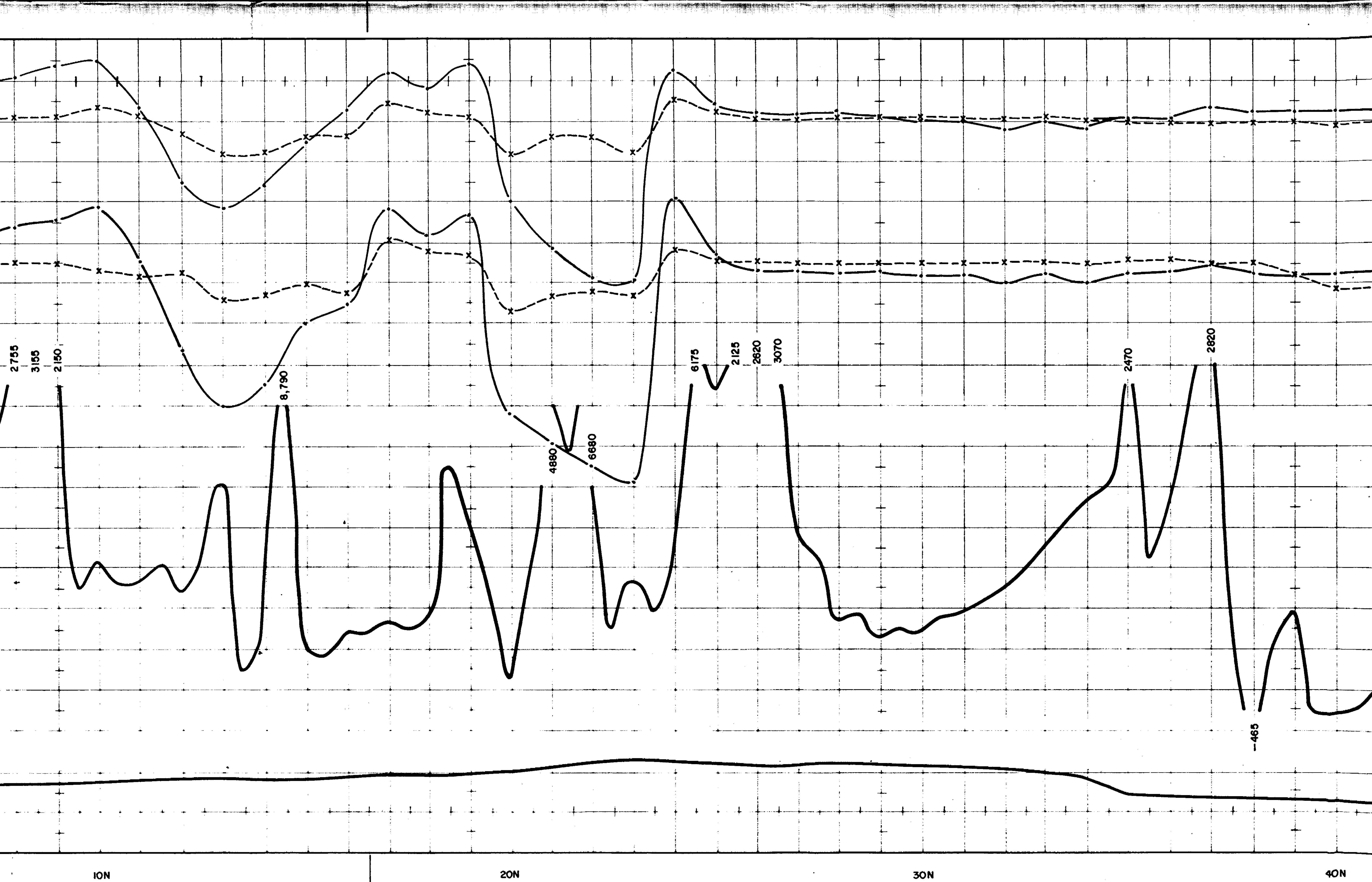
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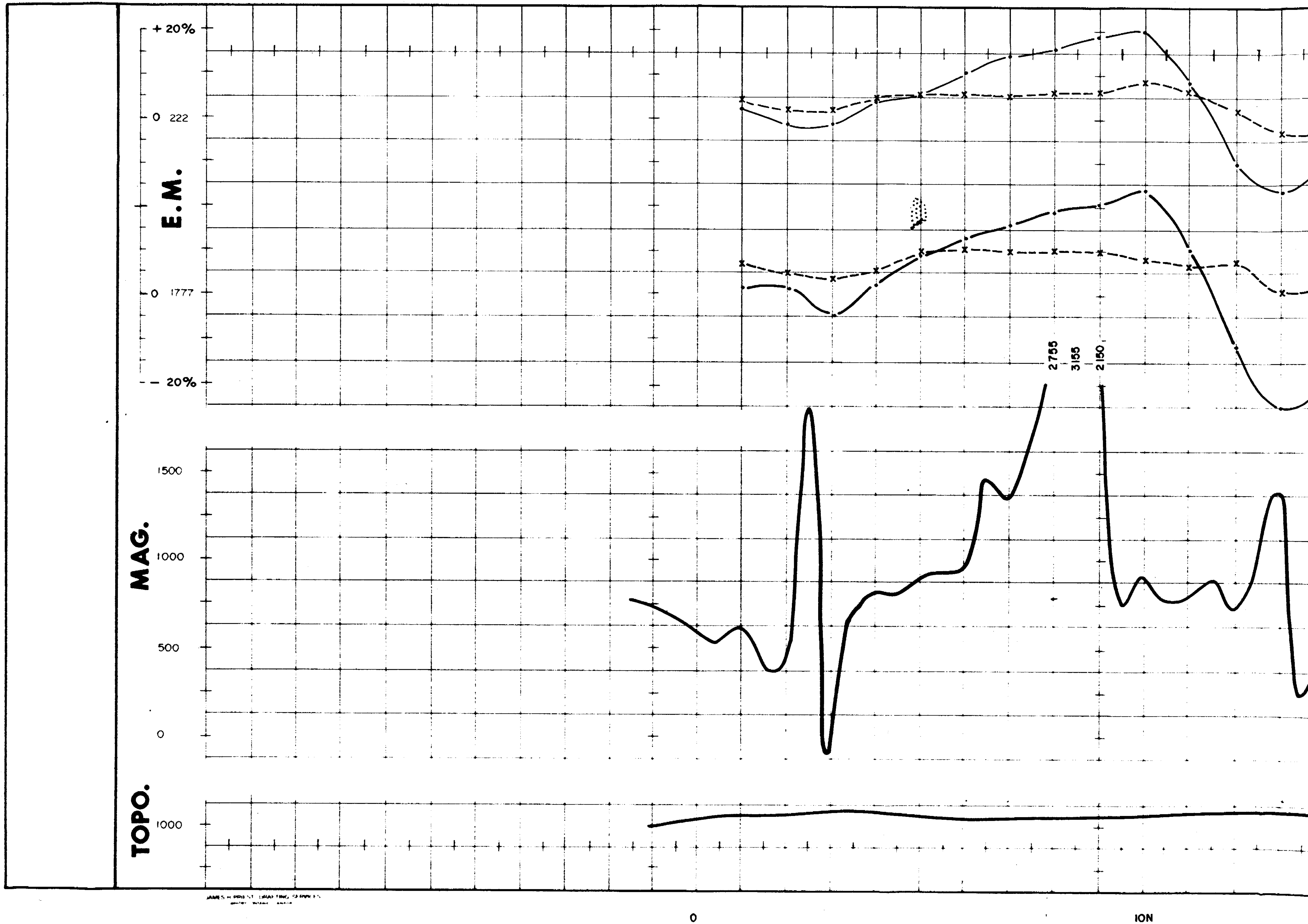
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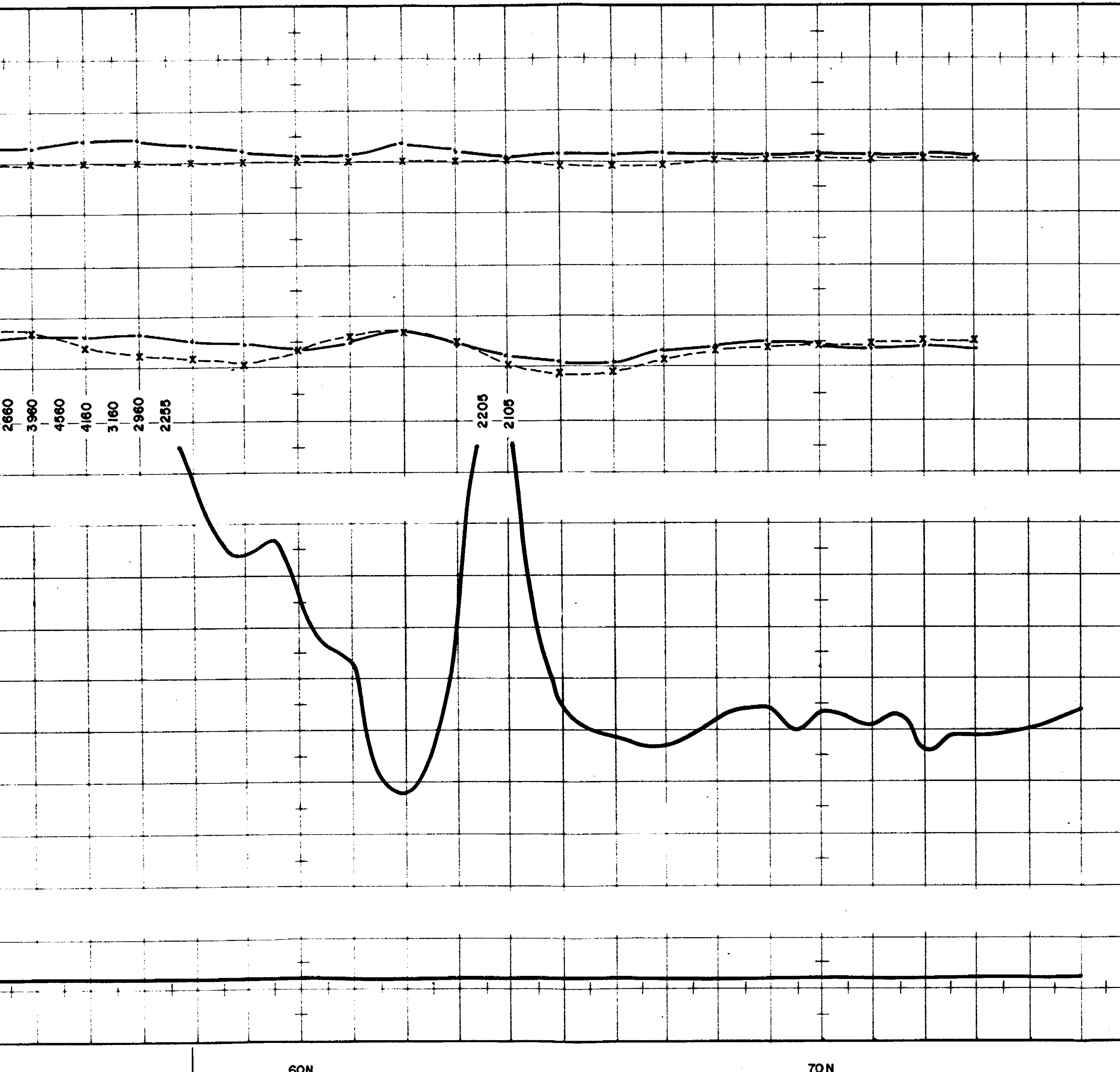
EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA



REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

LINE 46E

MARCH - 1978

3360
3860
5860
7060
3260
2060
4260
3860
9660
5260
9460
3660
2460
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3760
4160
3860
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−3140
− 690
− 20
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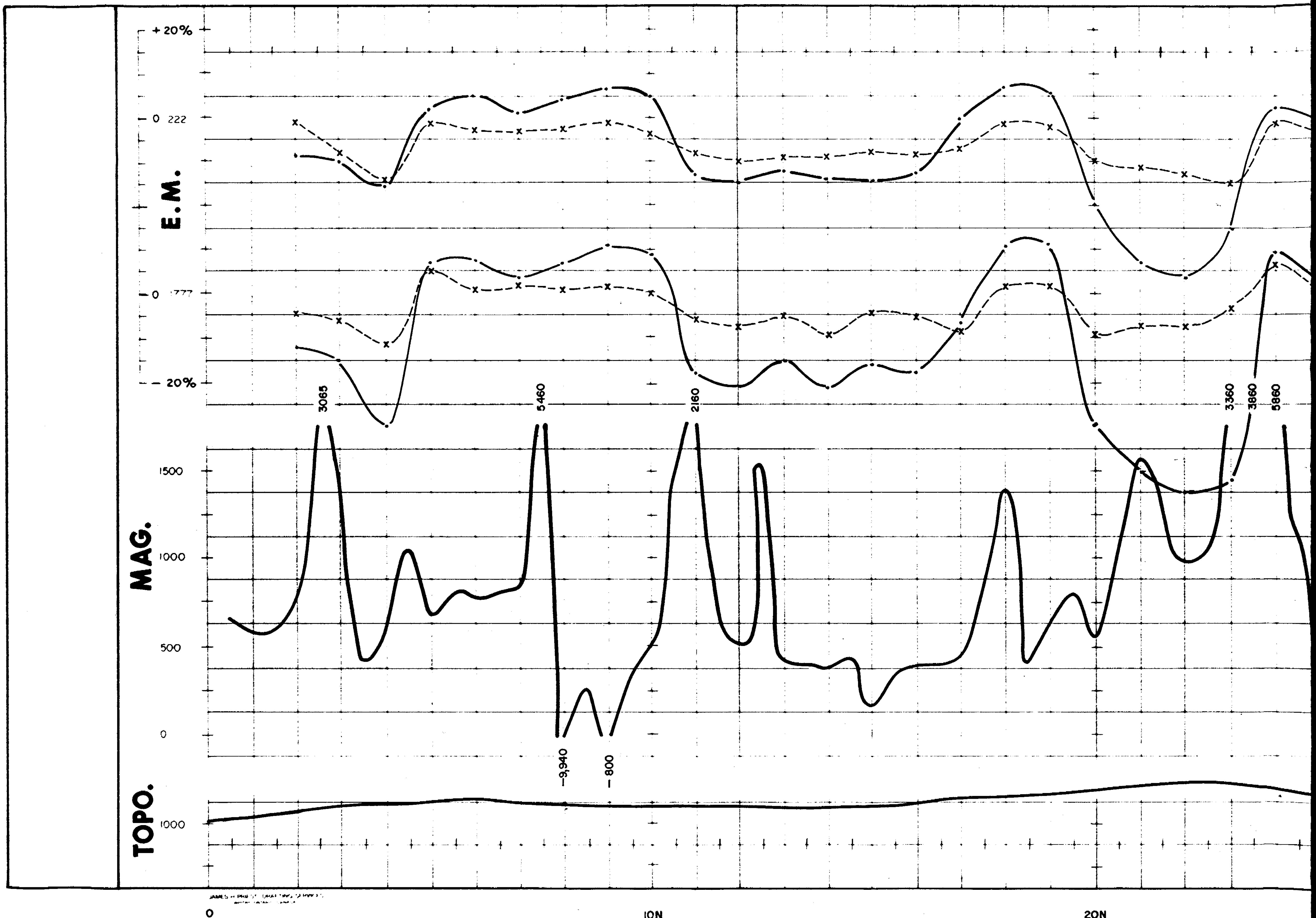
30N
40N
50N



+20%
0 222
E.M.
0 777
-20%
3065
5460
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5860
MAG.
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-800
TOPO.
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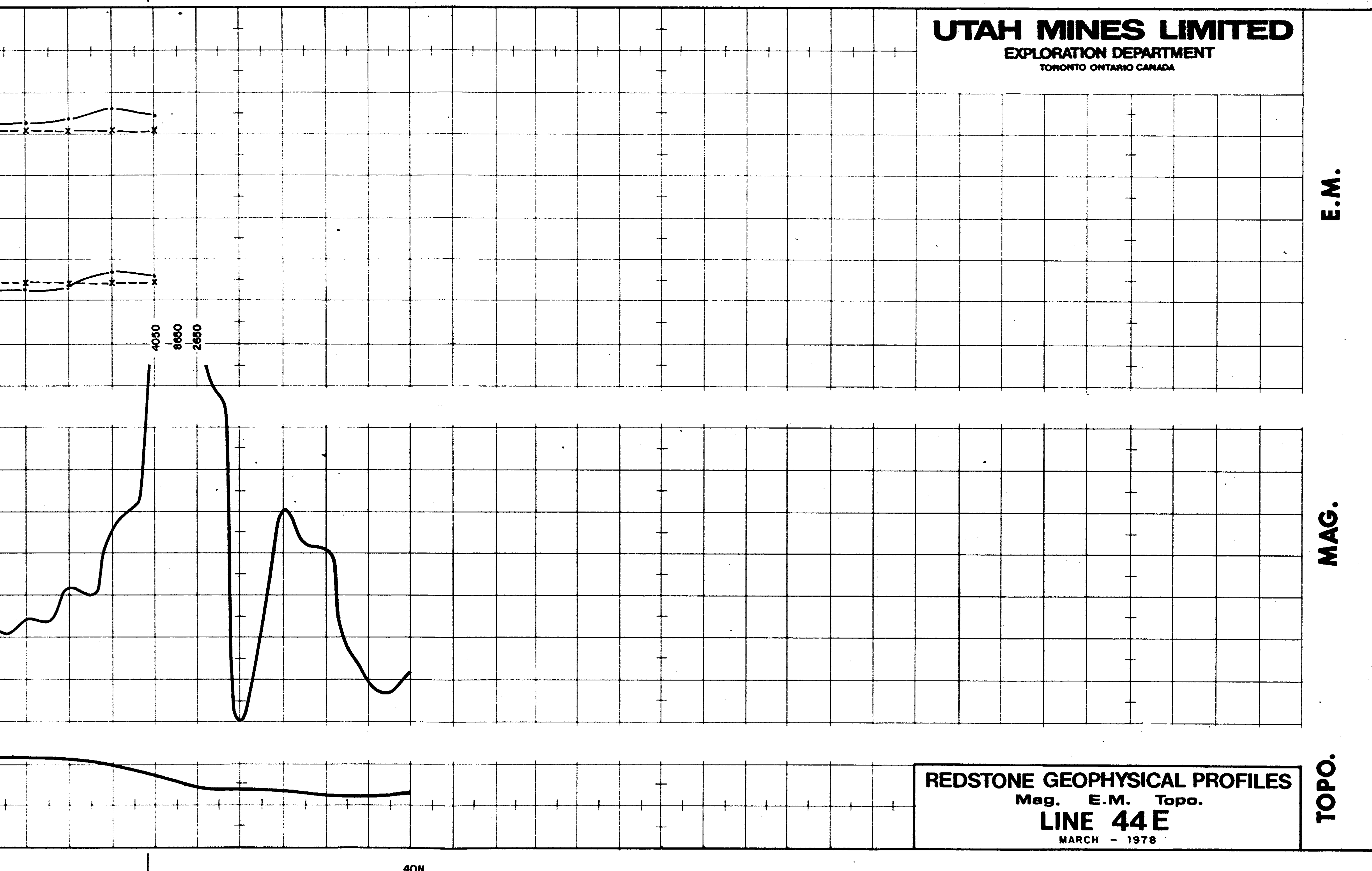
20N


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
4050
8650
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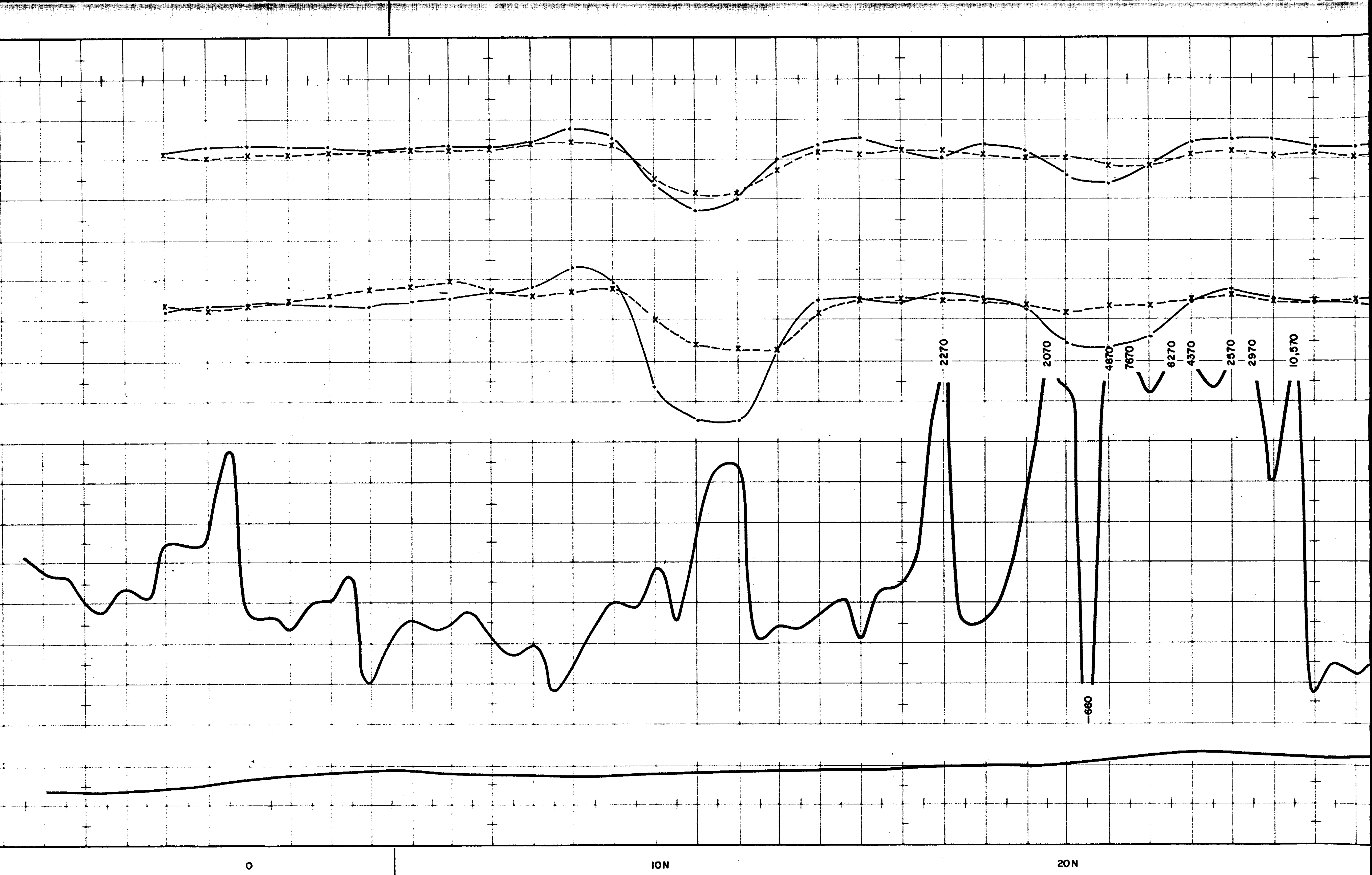
MAG.
TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 44 E
MARCH - 1978
40N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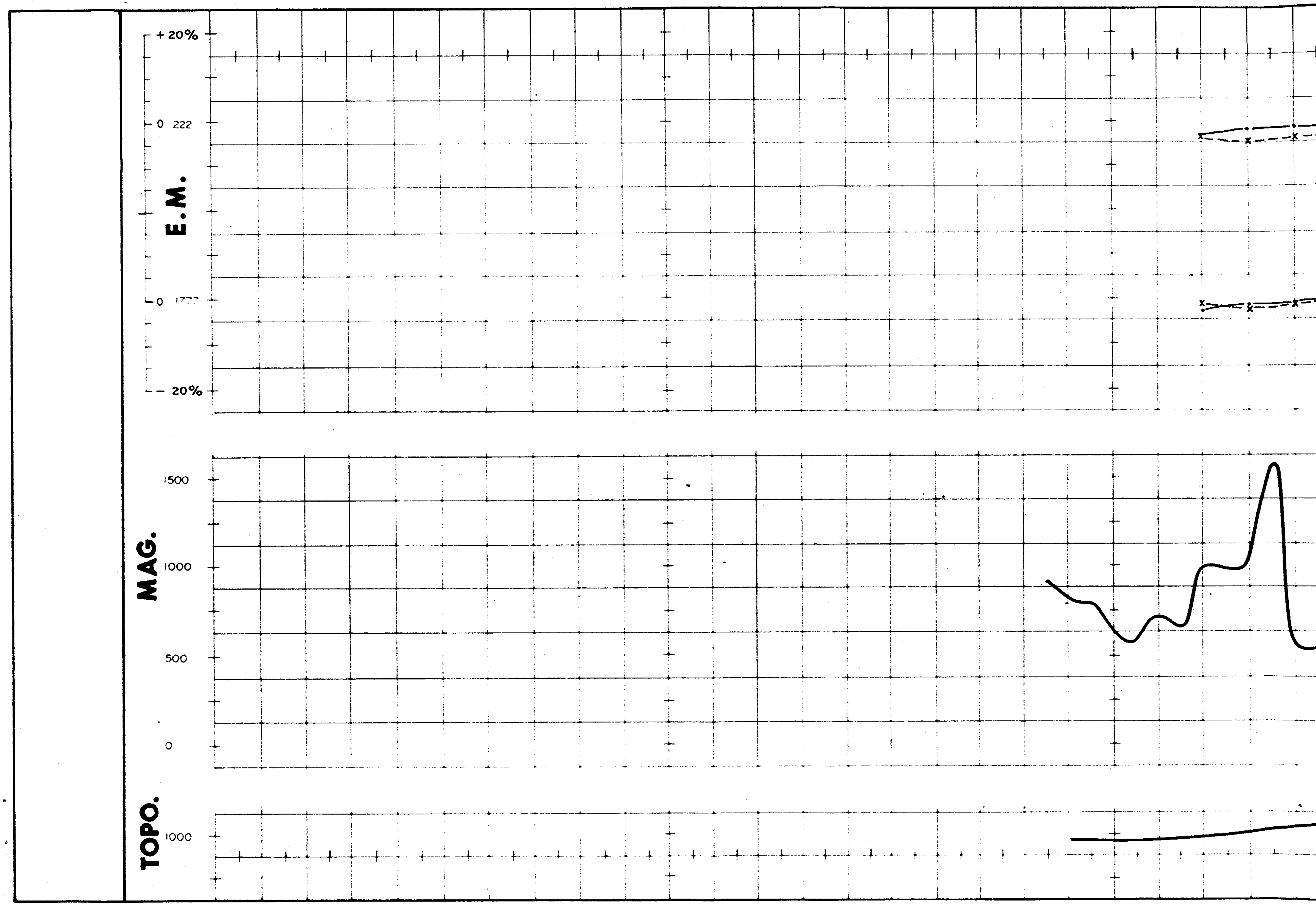

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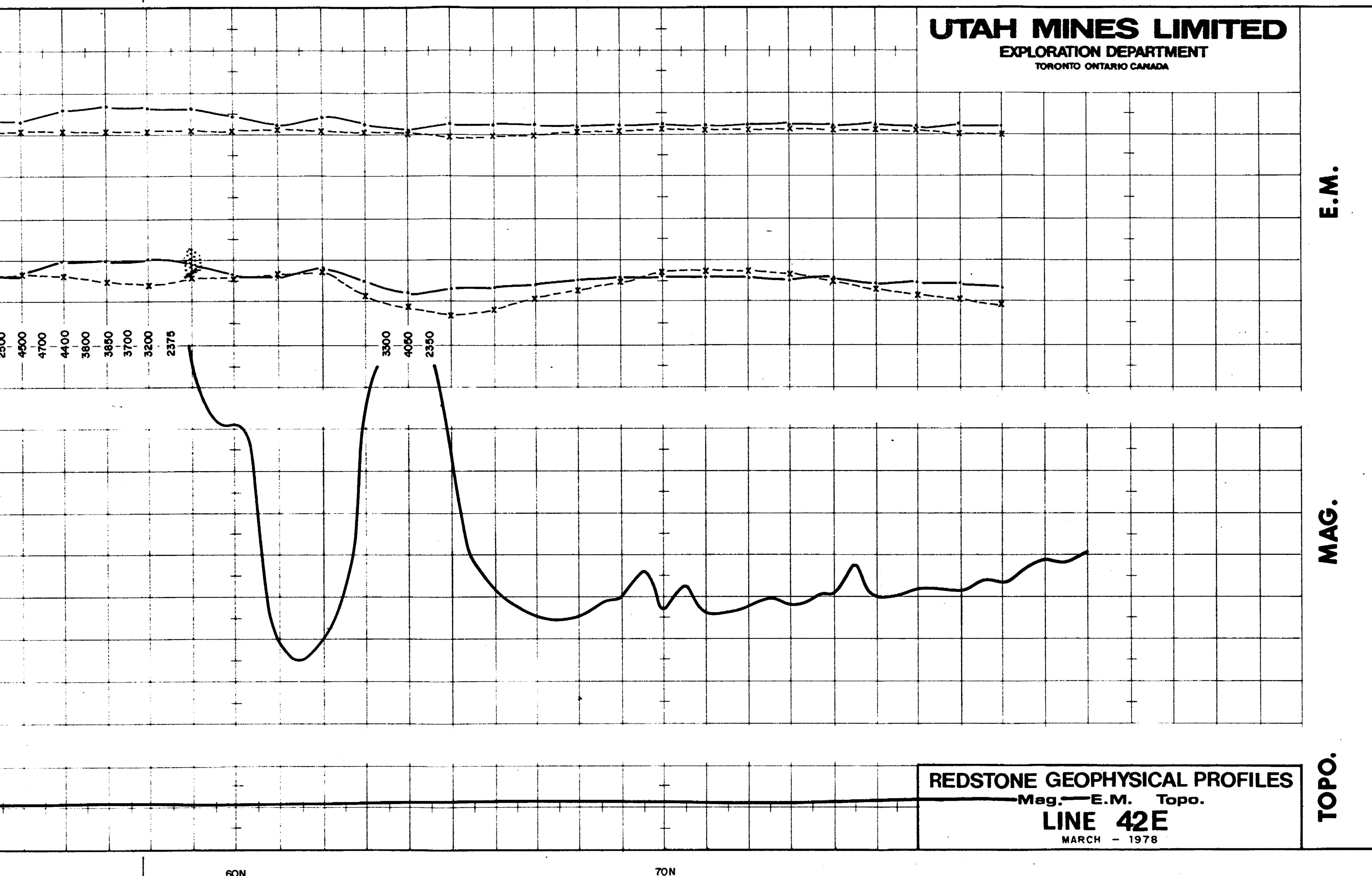
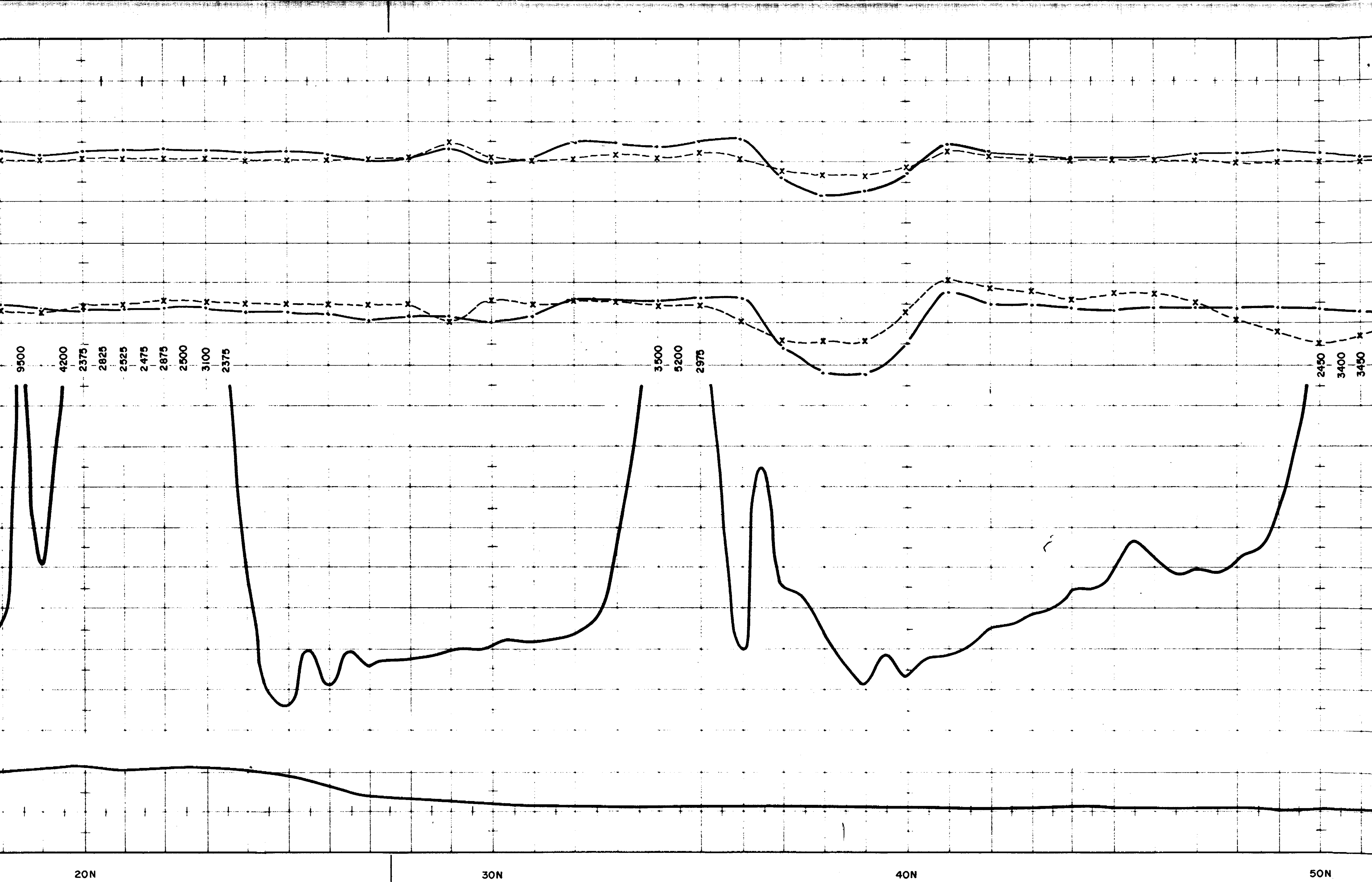


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
2500
4500
4700
4400
3600
3850
3700
3200
2375
3300
4050
2350
MAG.
TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 42E
MARCH - 1978
60N
70N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4200
2375
2825
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2475
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2375
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5200
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3450
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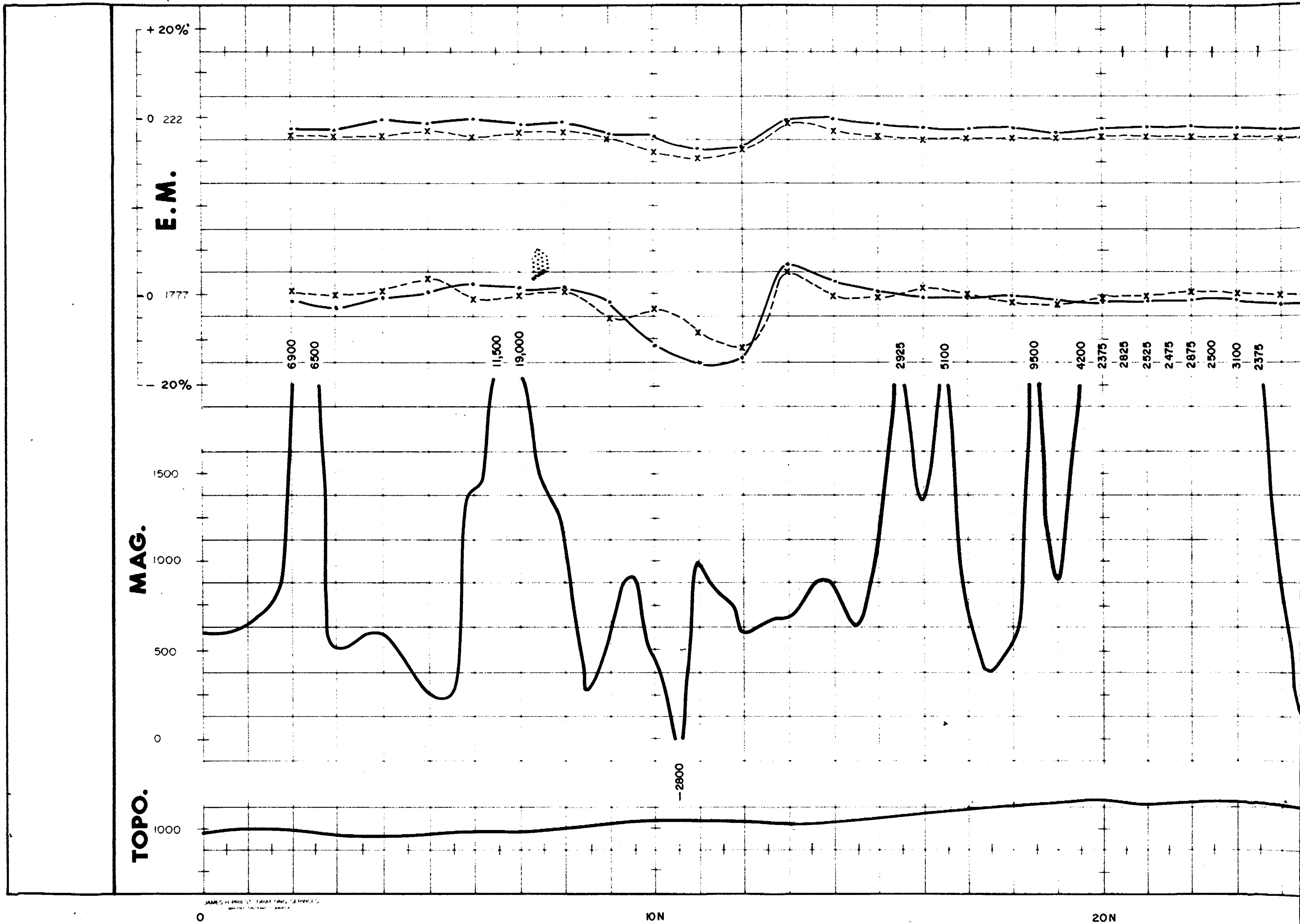
50N



E.M.
+ 20%
0 222
0 1777
- 20%
6900
6500
11,500
19,000
2925
5100
9500
4200
2375
2825
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3100
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MAG.
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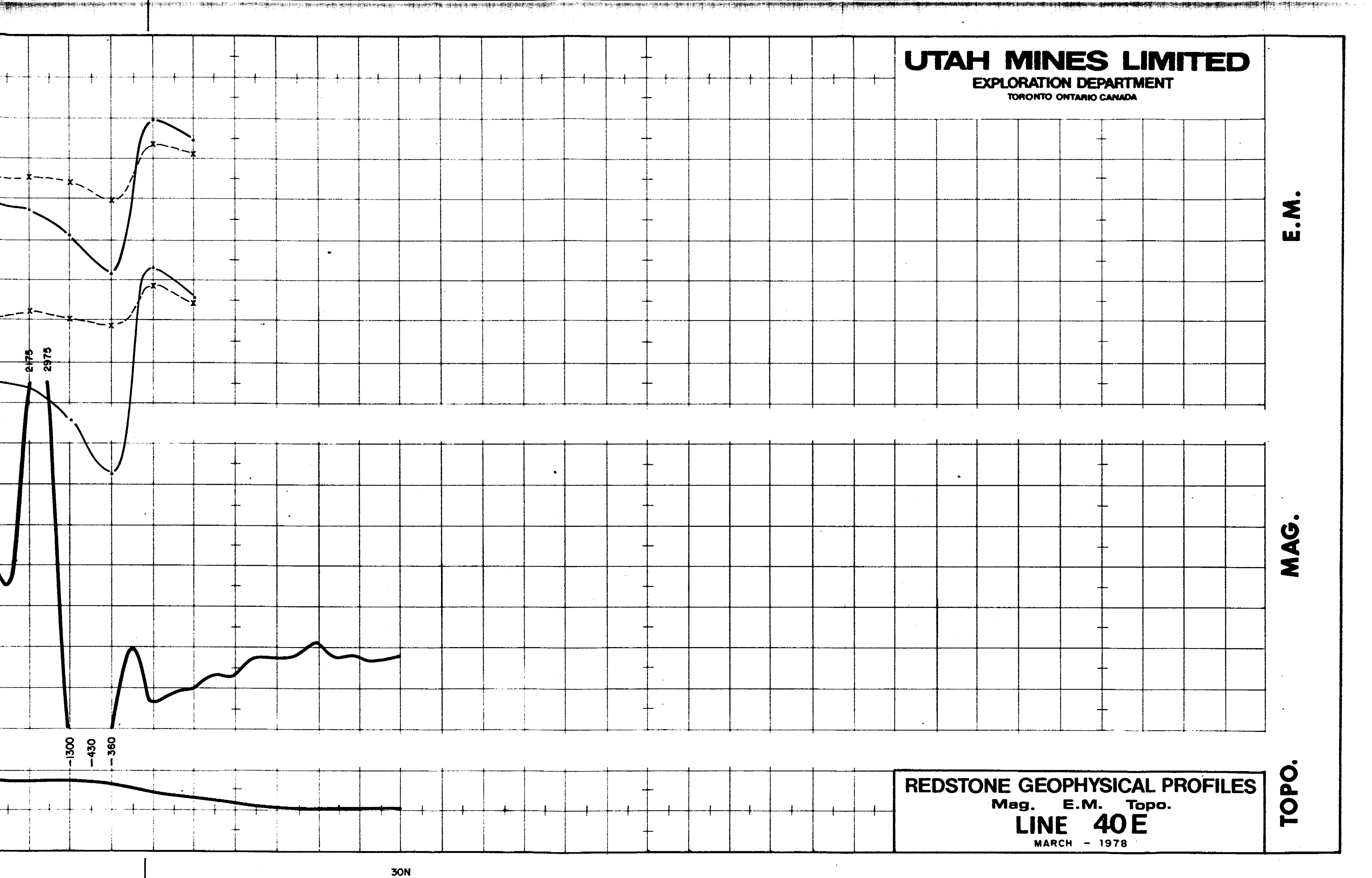
UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
MAG.
TOPO.
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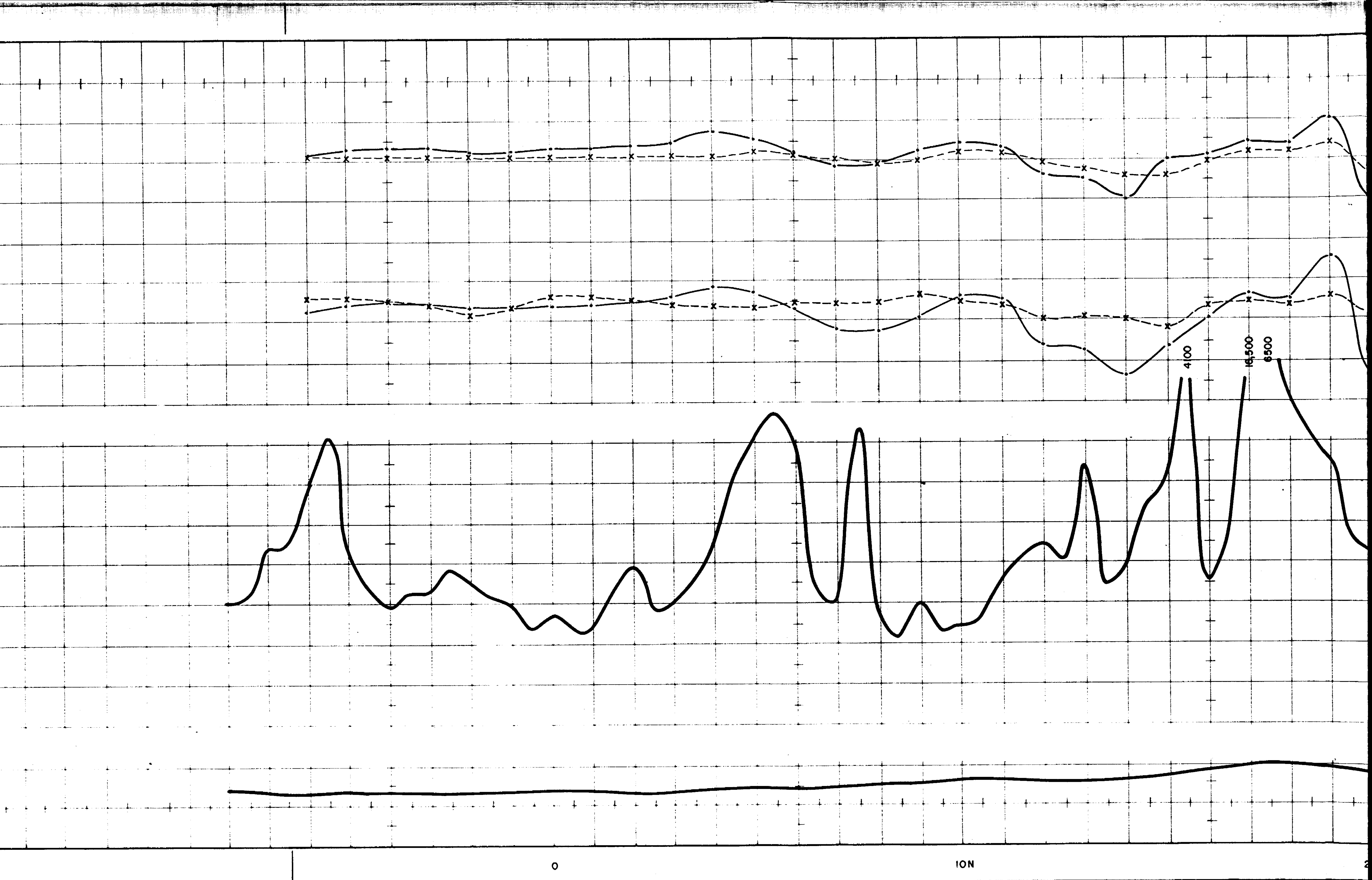
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 40E
MARCH - 1978
30N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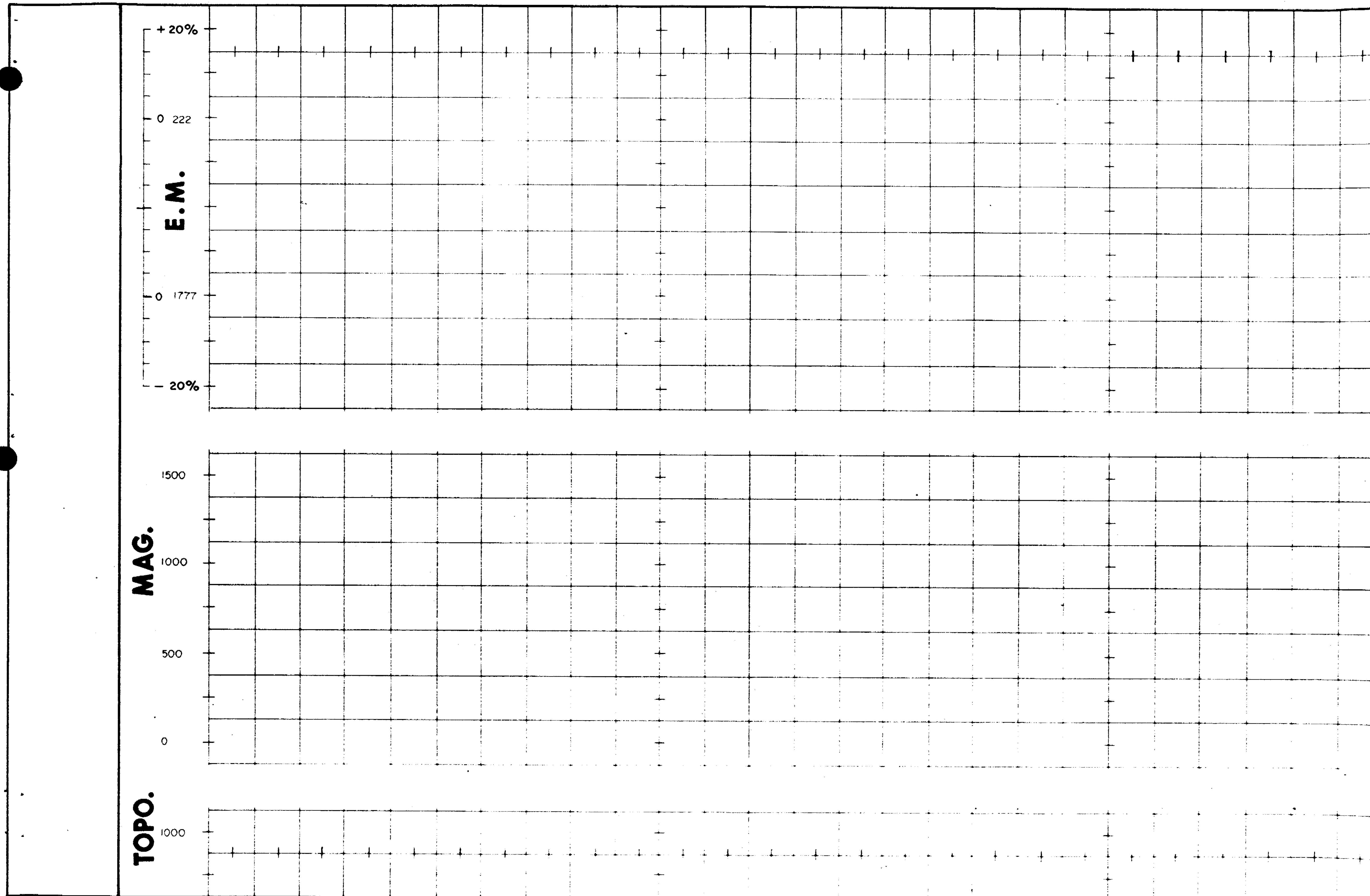
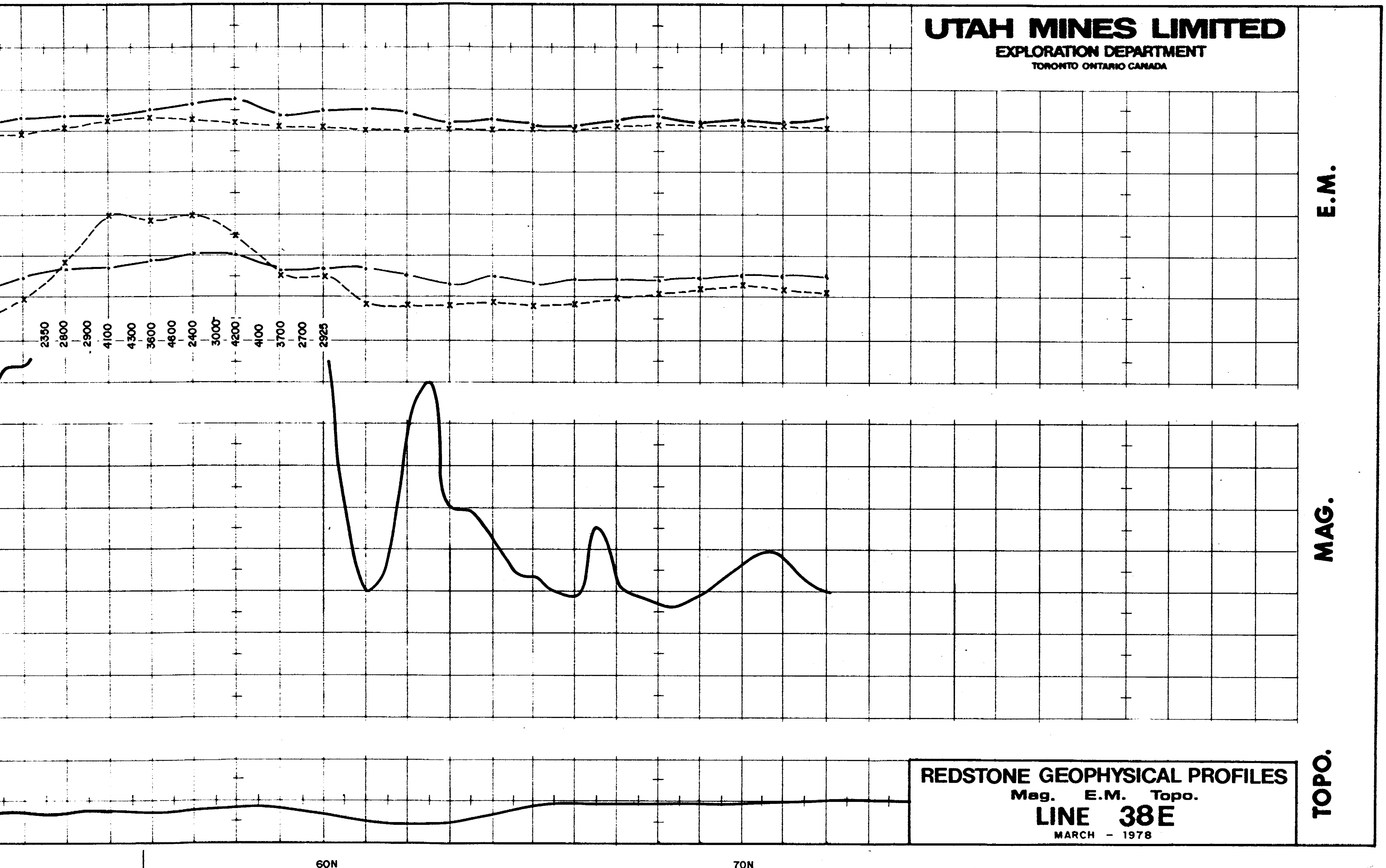
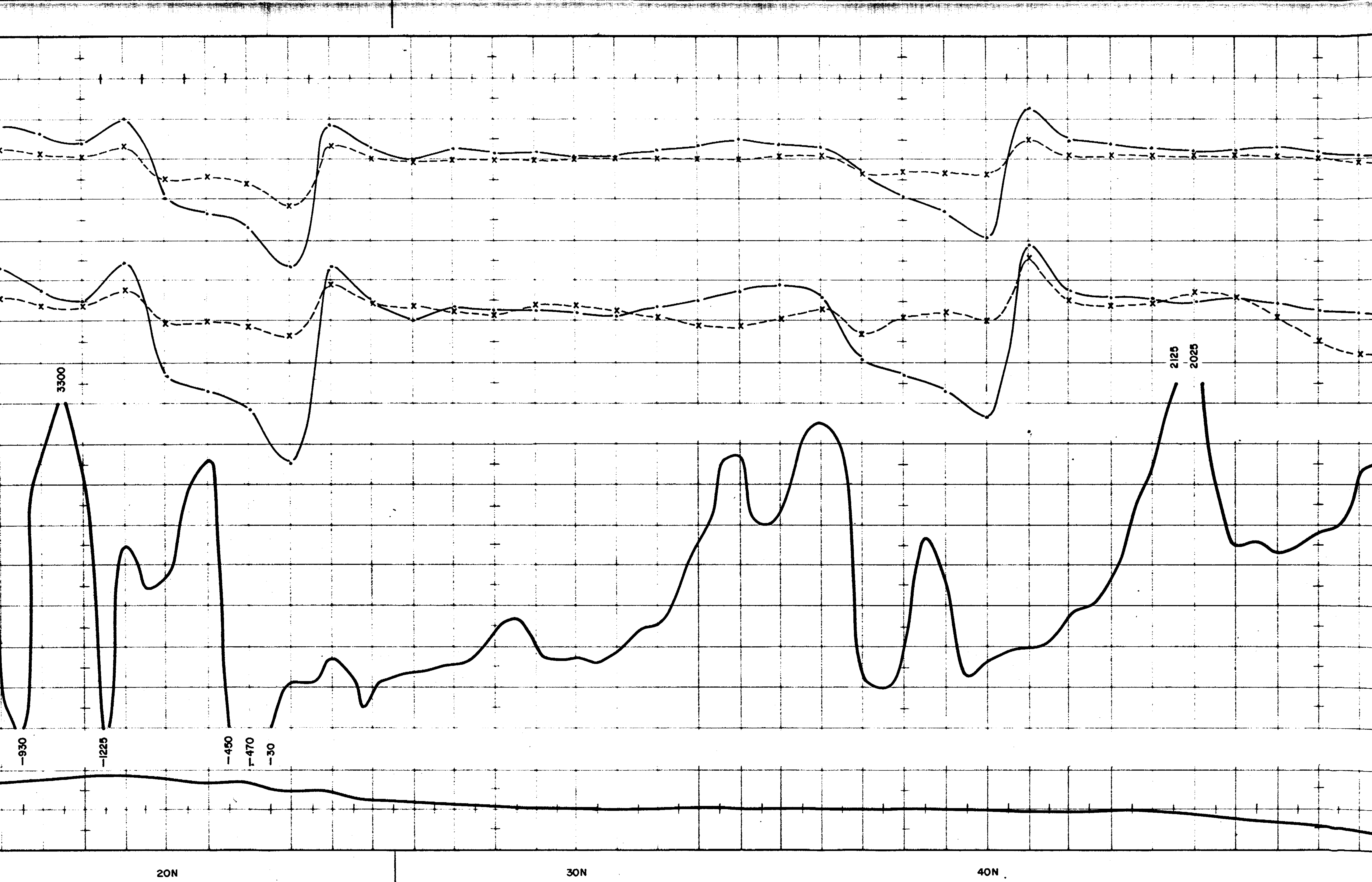


+ 20%
0 222
E.M.
0 1777
– 20%
1500
MAG.
1000
500
0
TOPO.
1000



UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
2350
2800
2900
4100
4300
3600
4600
2400
3000
4200
4100
3700
2700
2925
MAG.
TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 38E
MARCH - 1978
60N
70N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2025
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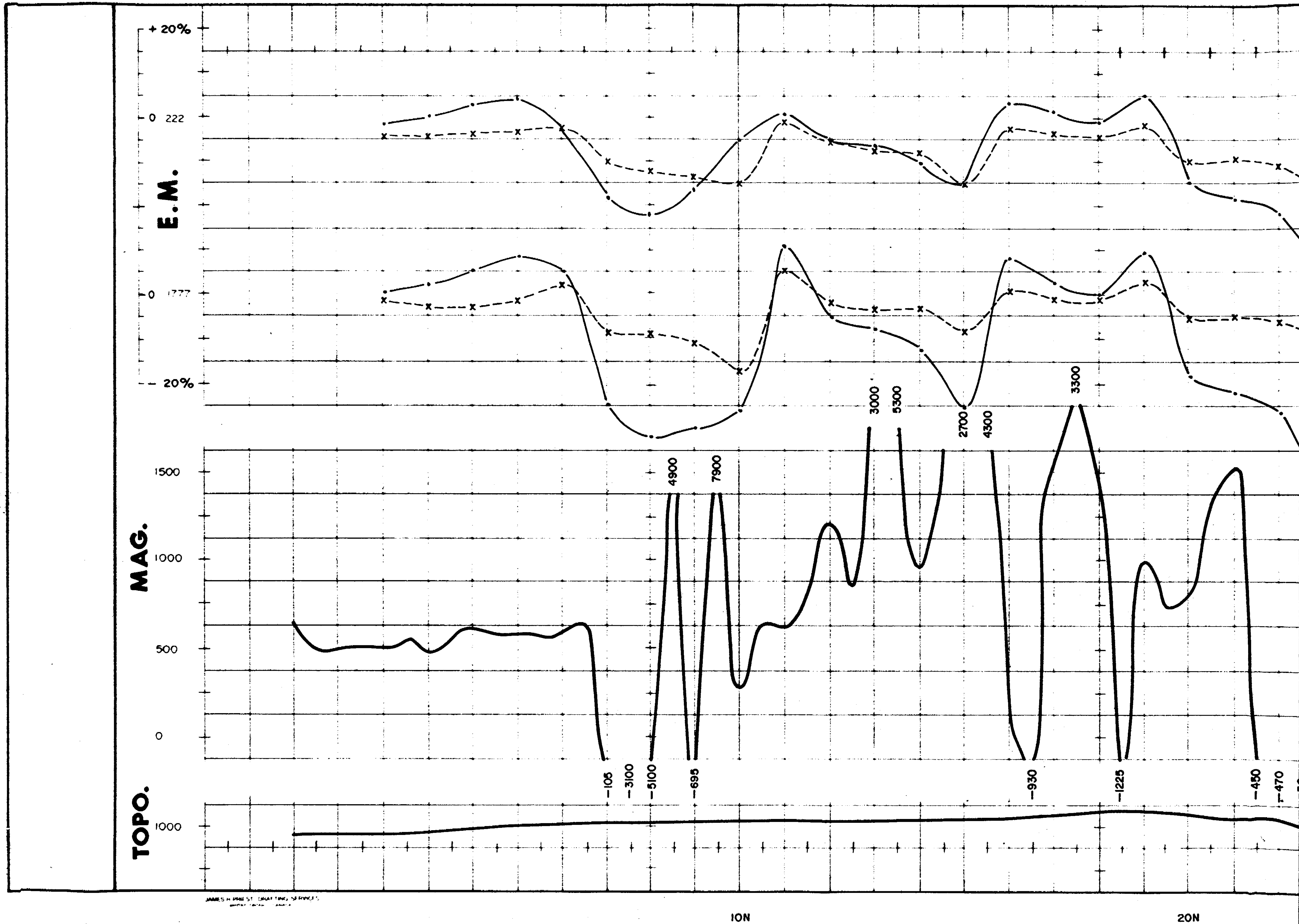
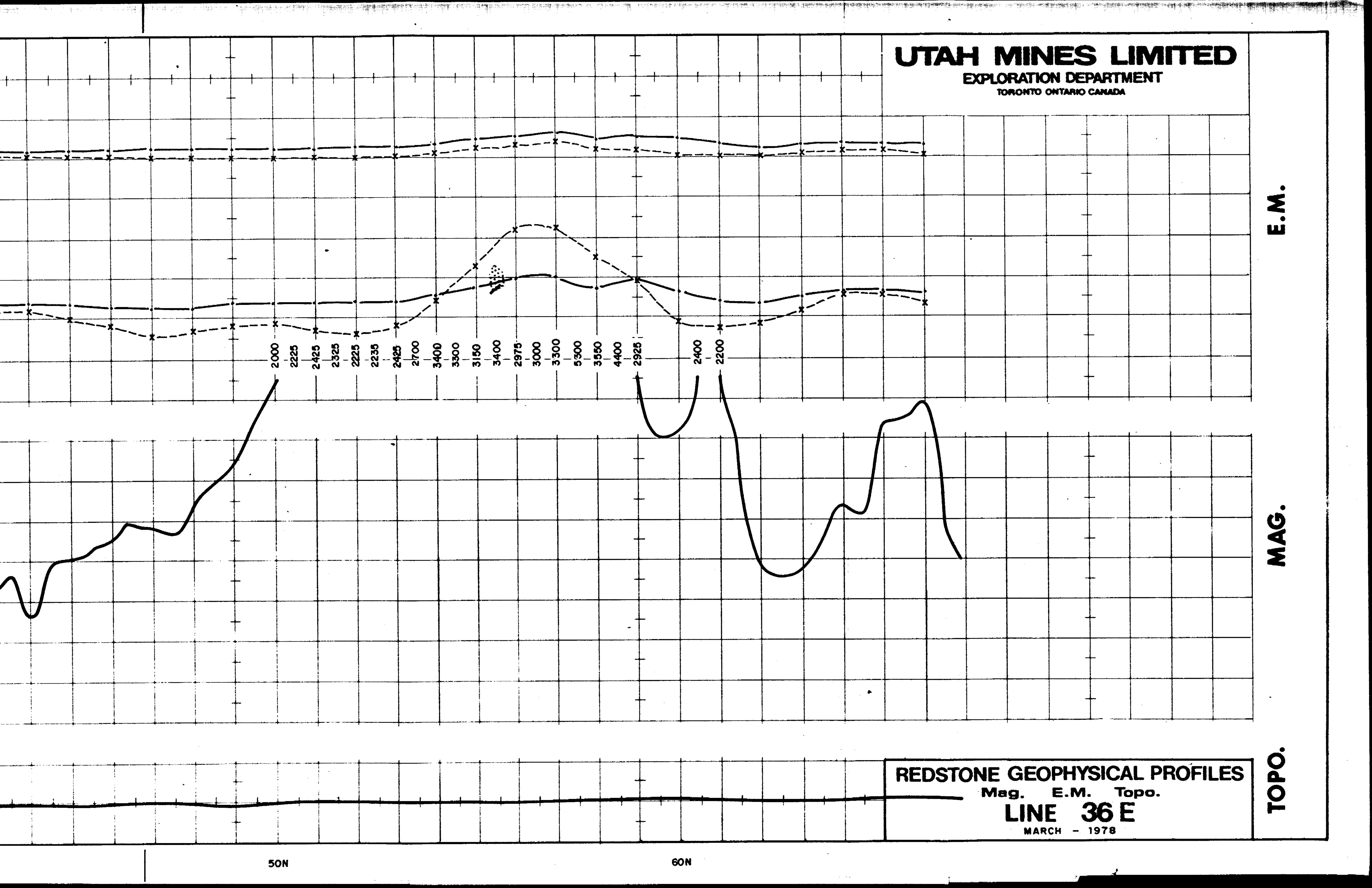


JAMES H PRIEST DRAFTING SERVICES


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
2000
2225
2425
2325
2225
2235
2425
2700
3400
3300
3150
3400
2975
3000
3300
5300
3550
4400
2925
2400
2200
MAG.
TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 36 E
MARCH - 1978
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60N


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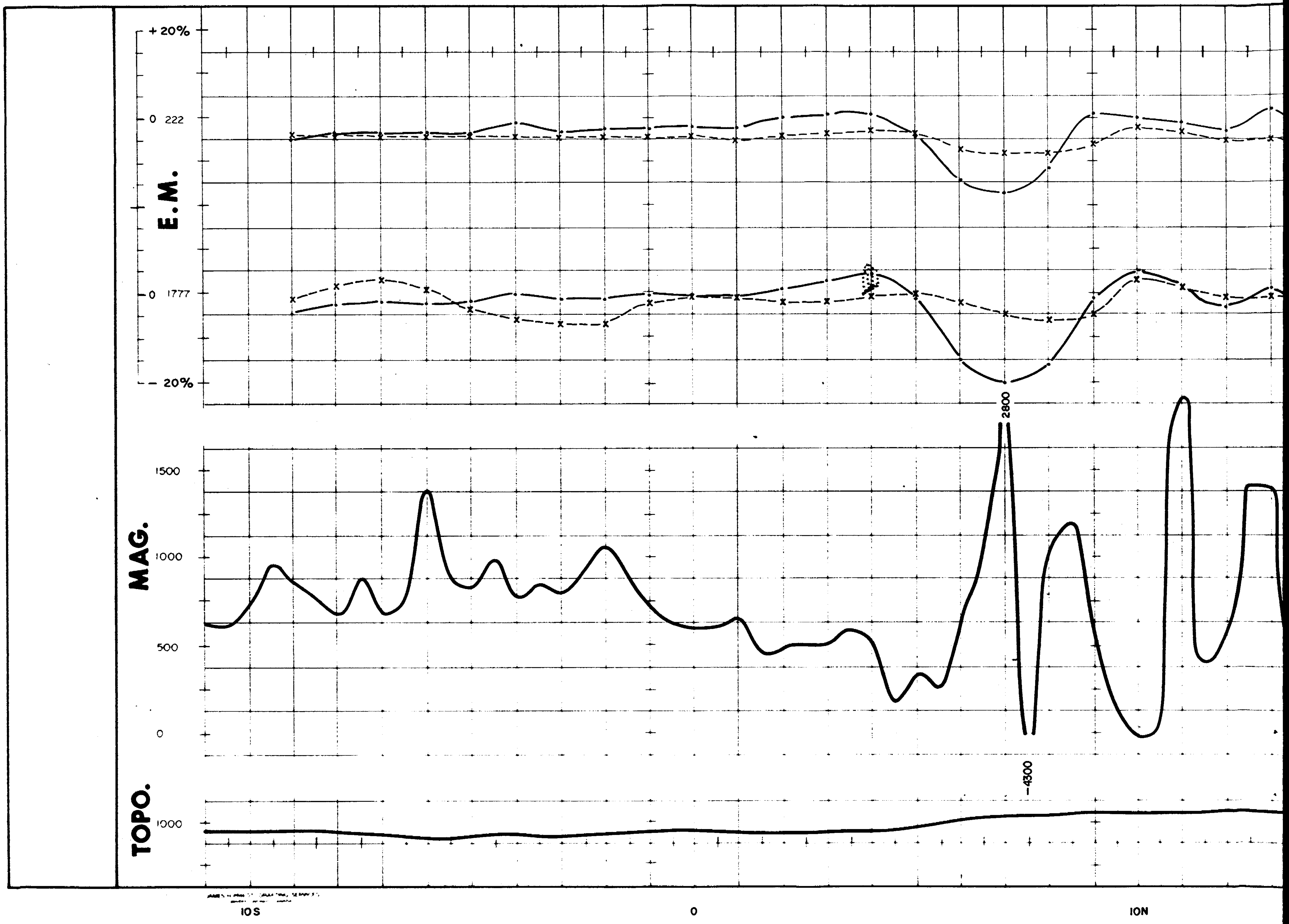
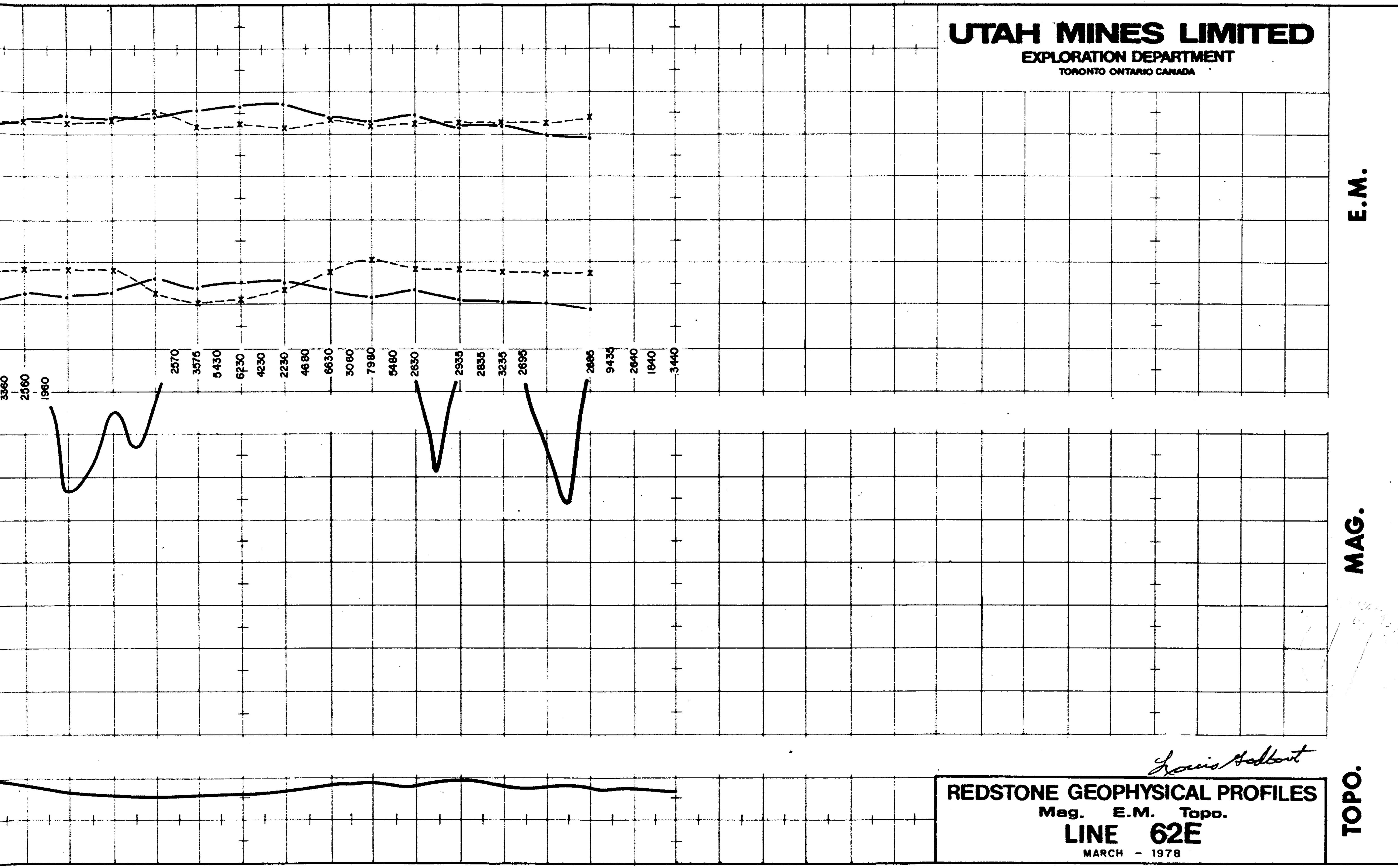


E.M.
+ 20%
0 222
0 1777
– 20%
2800
MAG.
1500
1000
500
0
-4300
TOPO.
1000
10S
0
10N

UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA

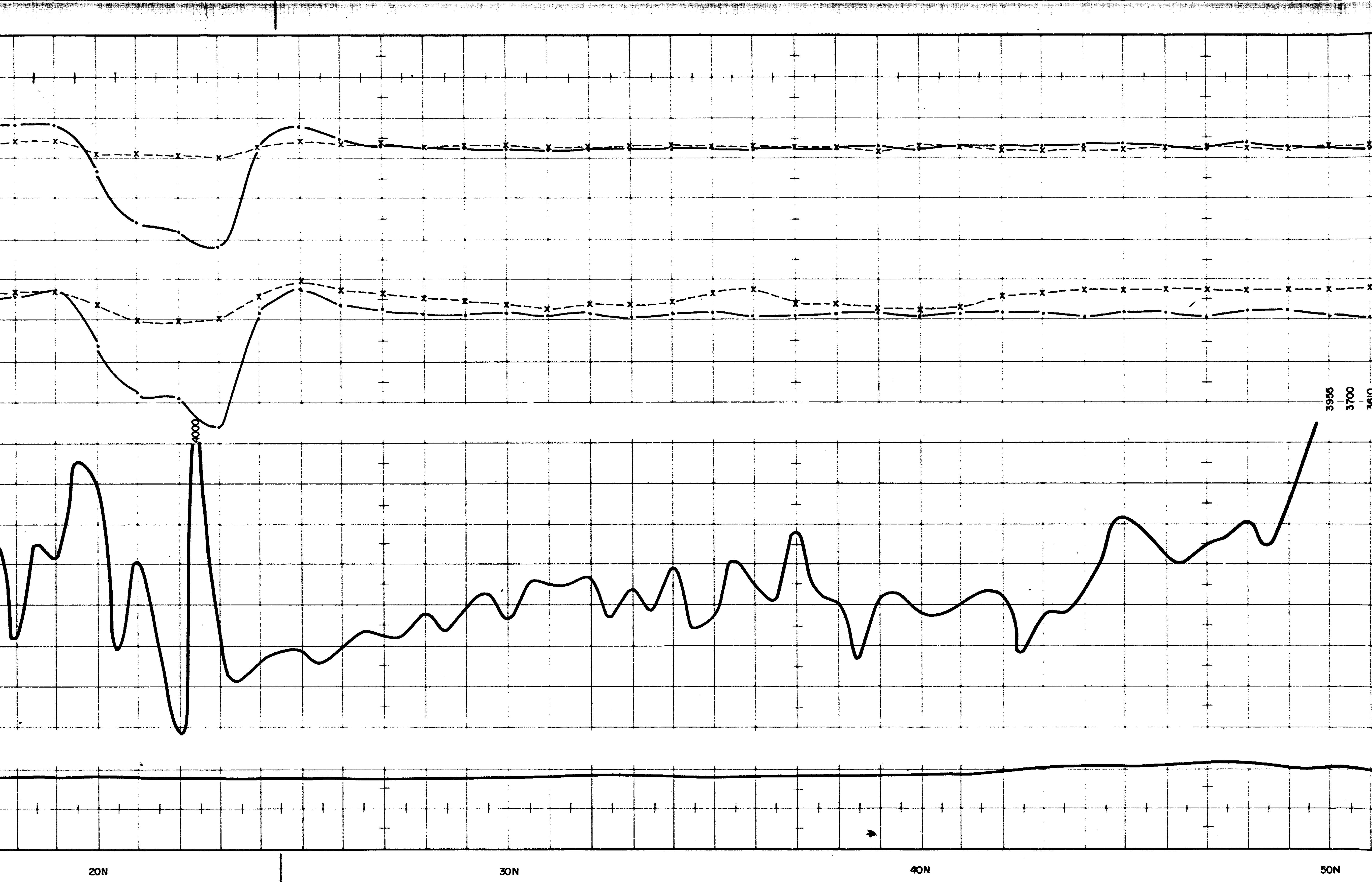


REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

LINE 62E

MARCH - 1978



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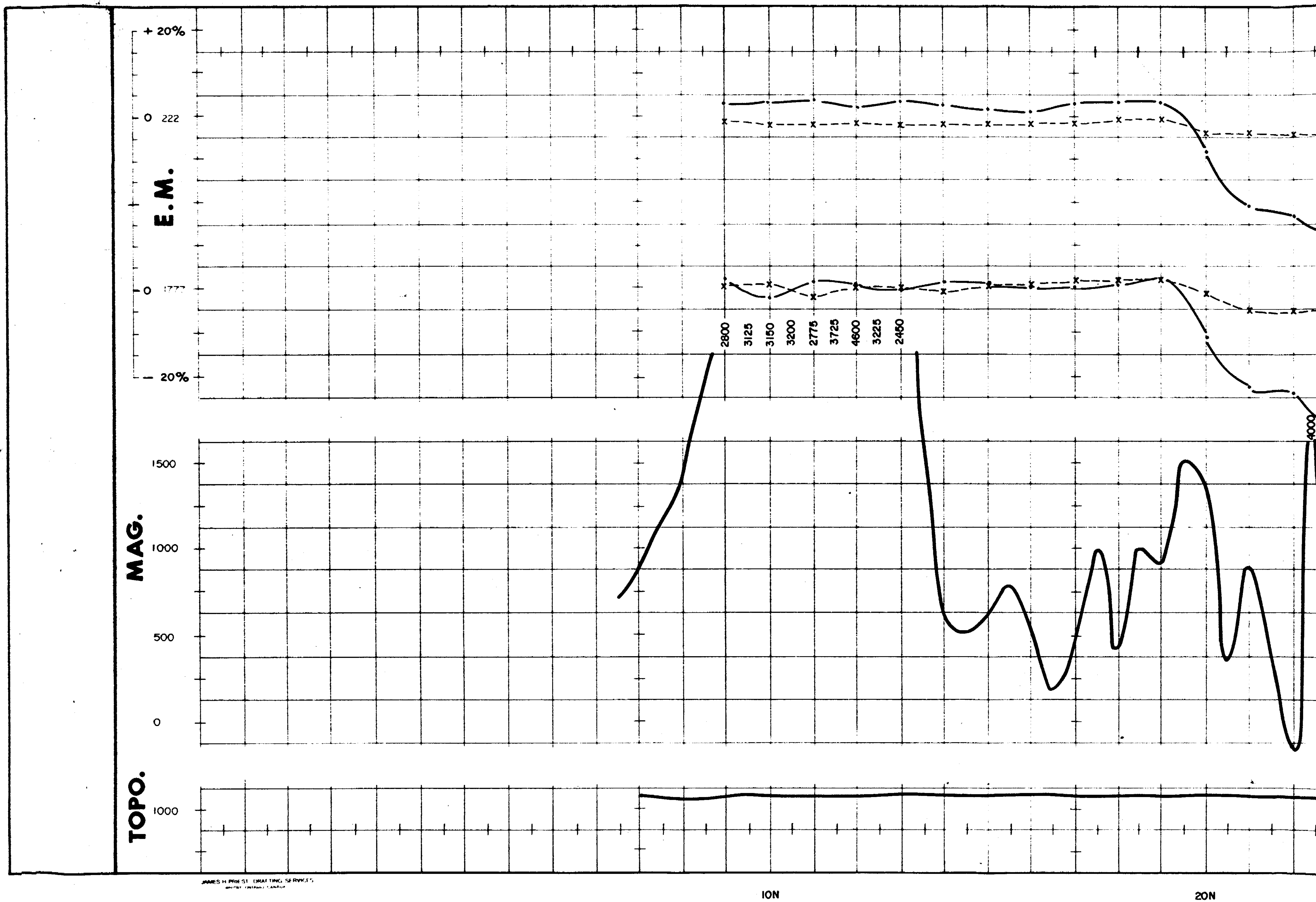
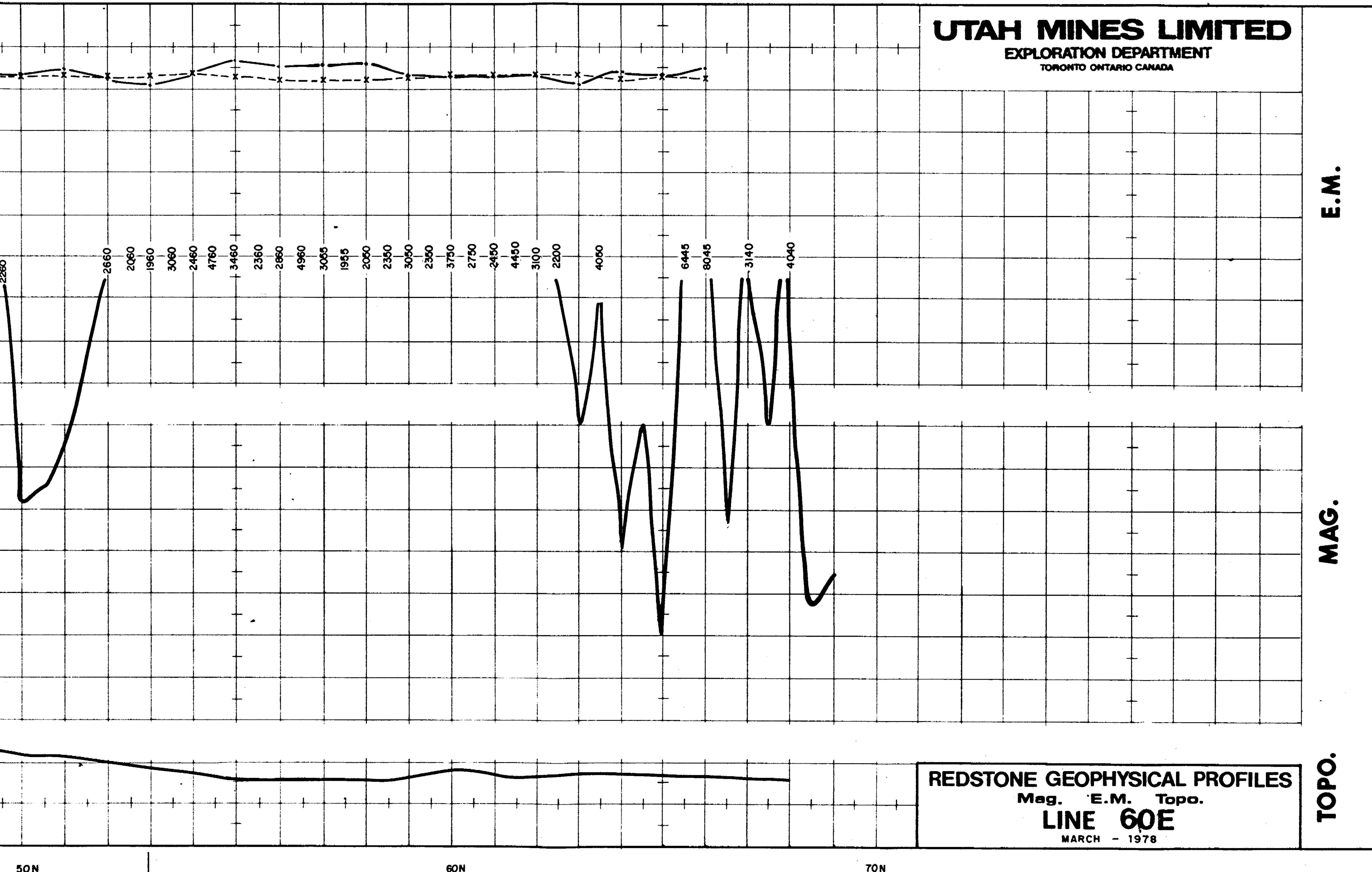
50N



E.M.
+ 20%
0 222
0
– 20%
2800
3125
3150
3200
2775
3725
4600
3225
2450
4000
MAG.
1500
1000
500
0
TOPO.
1000
10N
20N



UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
MAG.
TOPO.
2260
2660
2060
1960
3060
2460
4760
3460
2360
2860
4960
3055
1955
2050
2350
3050
2350
3750
2750
2450
4450
3100
2200
4050
6445
8045
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4040
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 60E
MARCH - 1978
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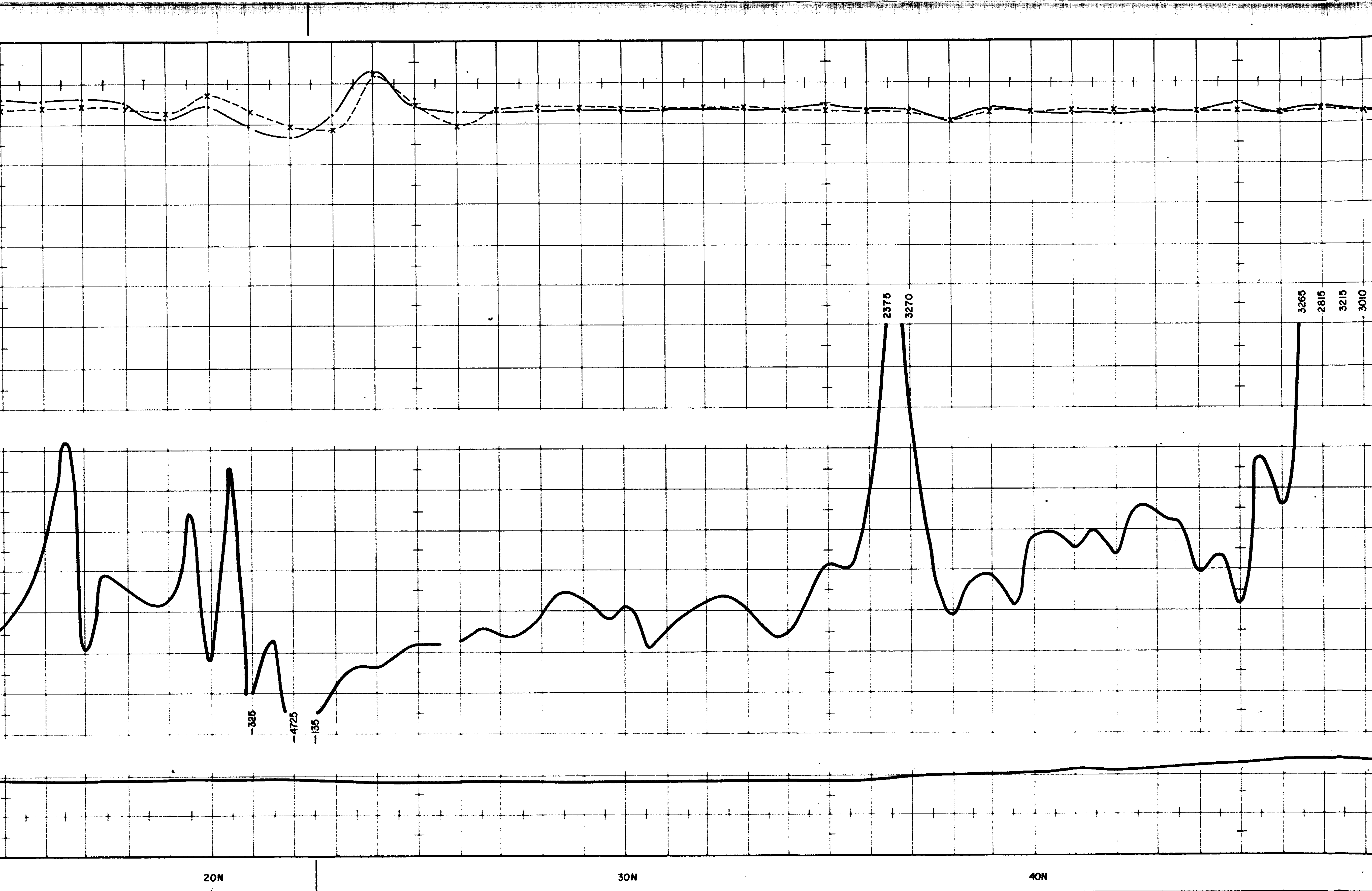
60N
70N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2815
3215
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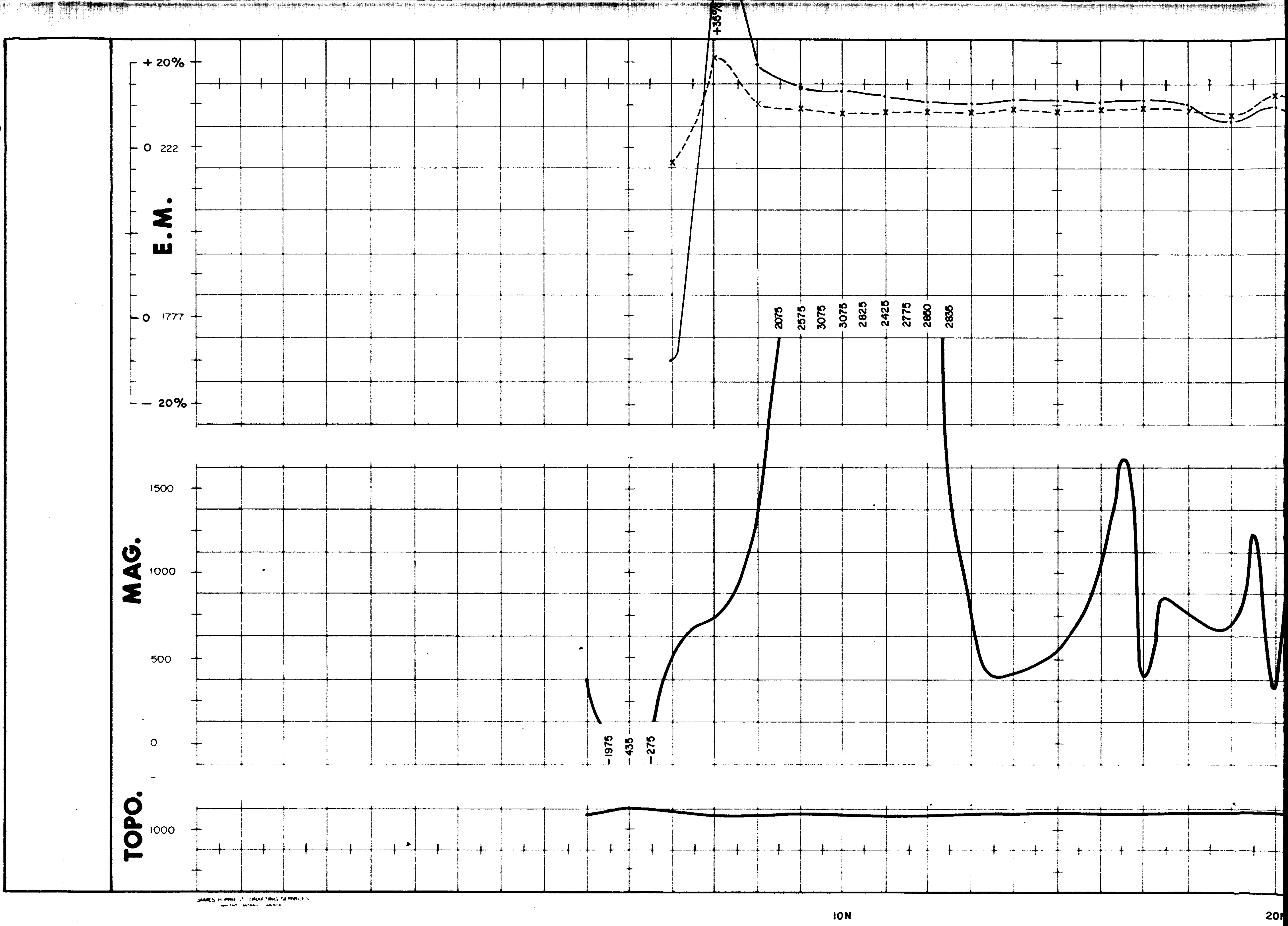
-4725
-135
20N
30N
40N



E.M.
+ 20%
0 222
0 1777
– 20%
+35%
2075
2575
3075
3075
2825
2425
2775
2850
2835
MAG.
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500
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TOPO.
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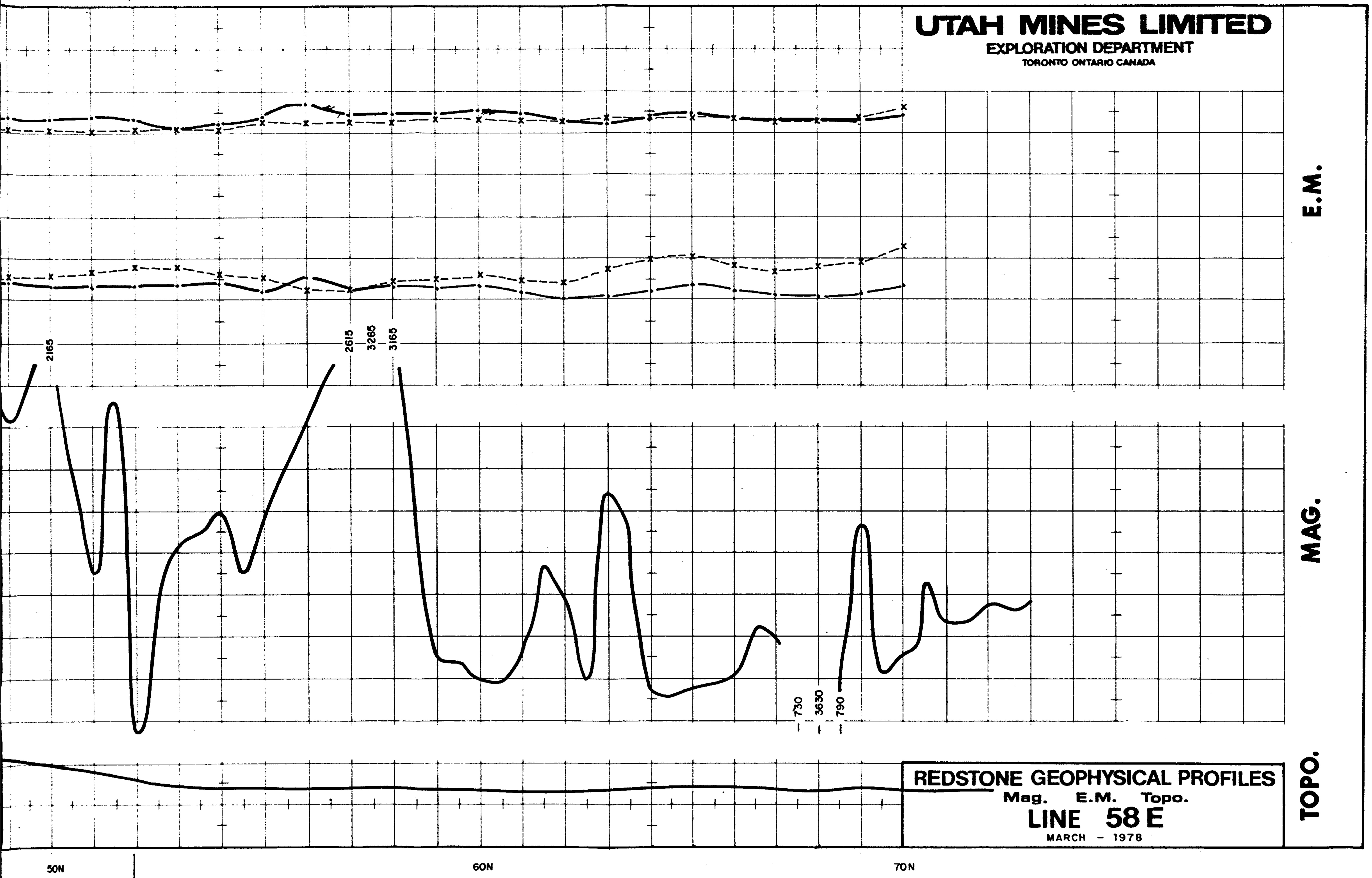
JAMES H. PRIEST DRAFTING SERVICES
10N
20N


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
MAG.
TOPO.
2165
2615
3265
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3630
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REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 58 E
MARCH - 1978
50N
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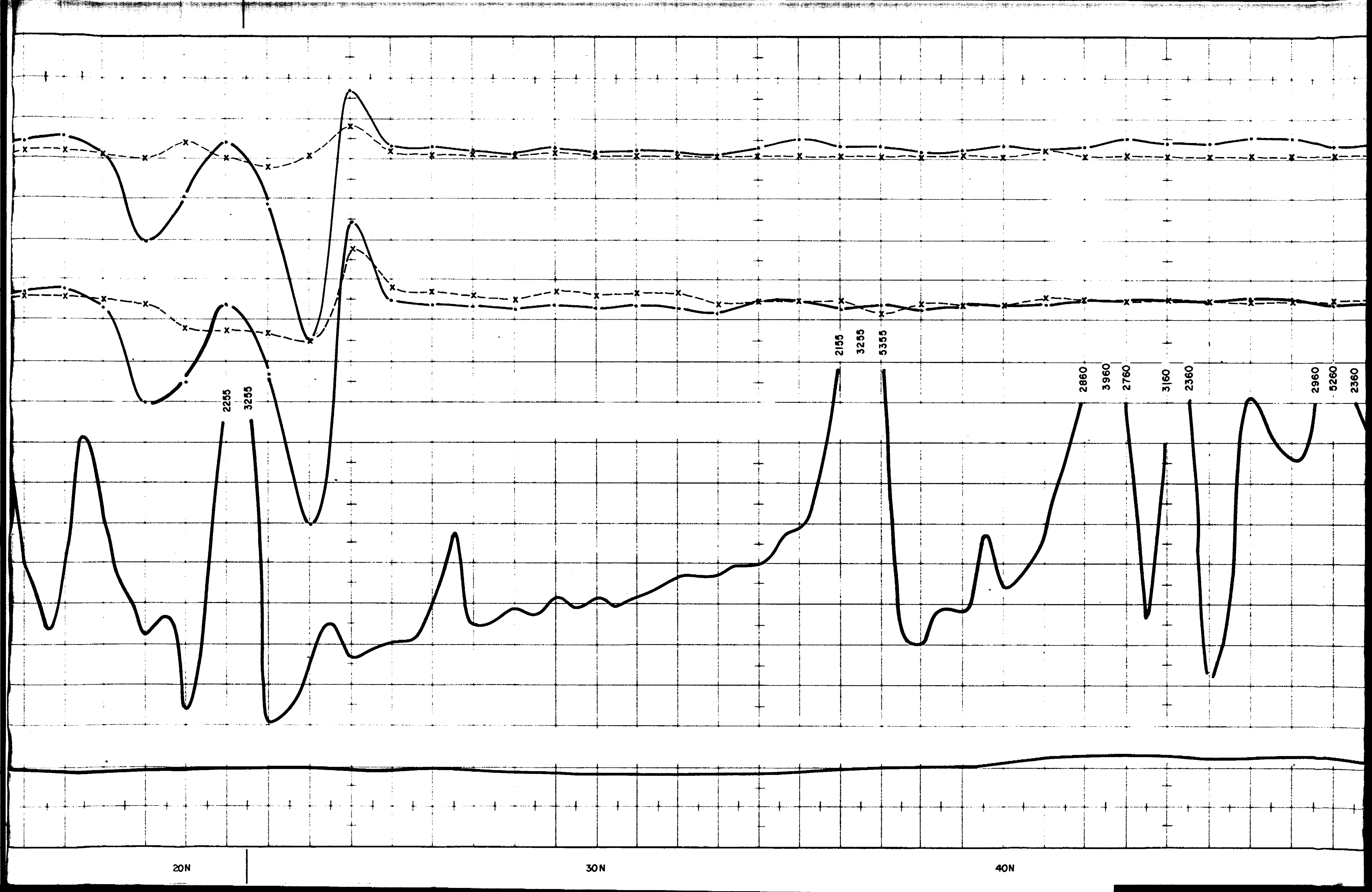
70N



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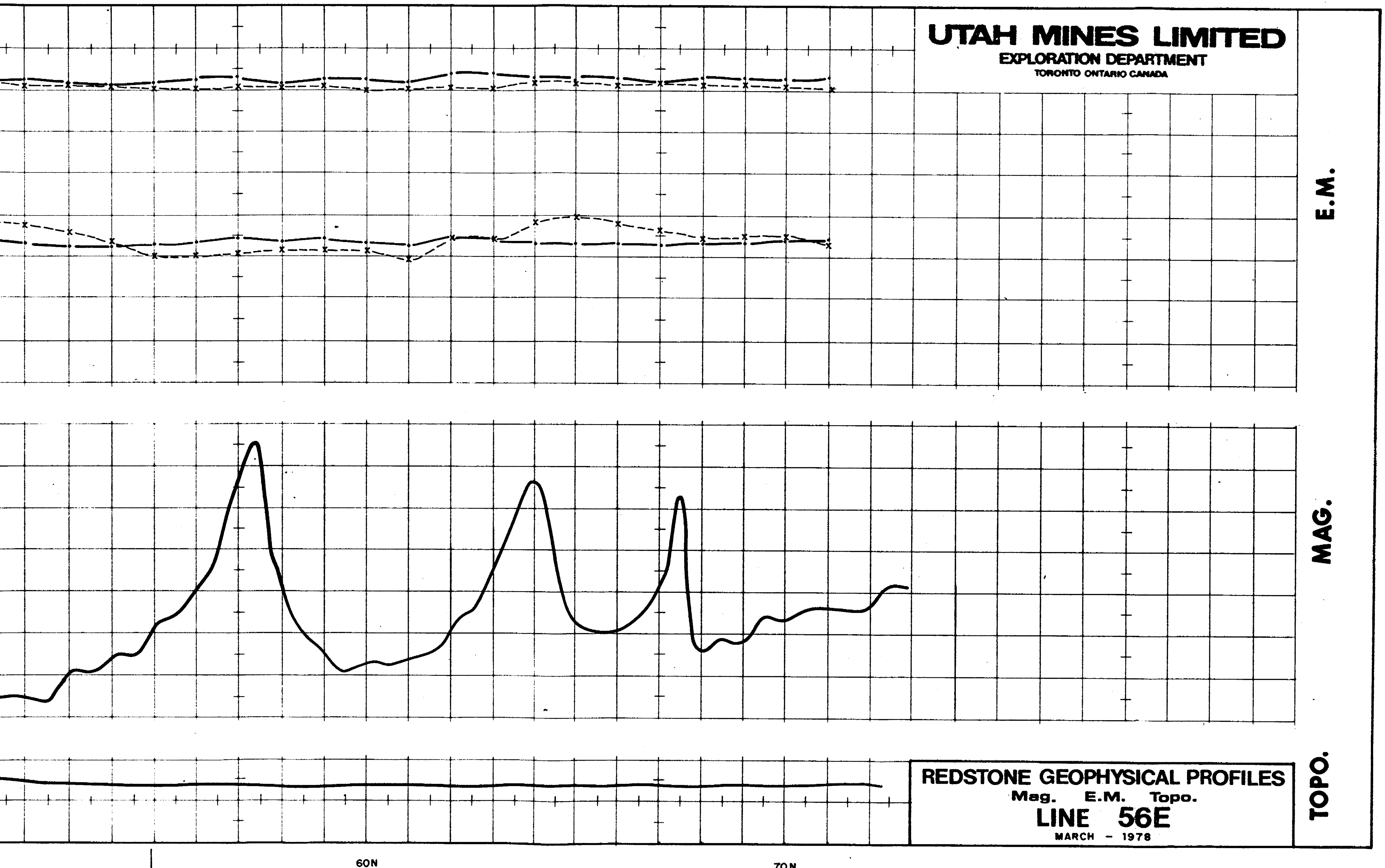
3255
2155
3255
5355
2860
3960
2760
3160
2360
2960
5260
2360
20N
30N
40N

+ 20%
0 222
E.M.
0
- 20%
8070
2665
2615
2215
1500
MAG.
1000
500
0
1130
1030
TOPO.
1000
0
10N


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
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MAG.
TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 56E
MARCH - 1978
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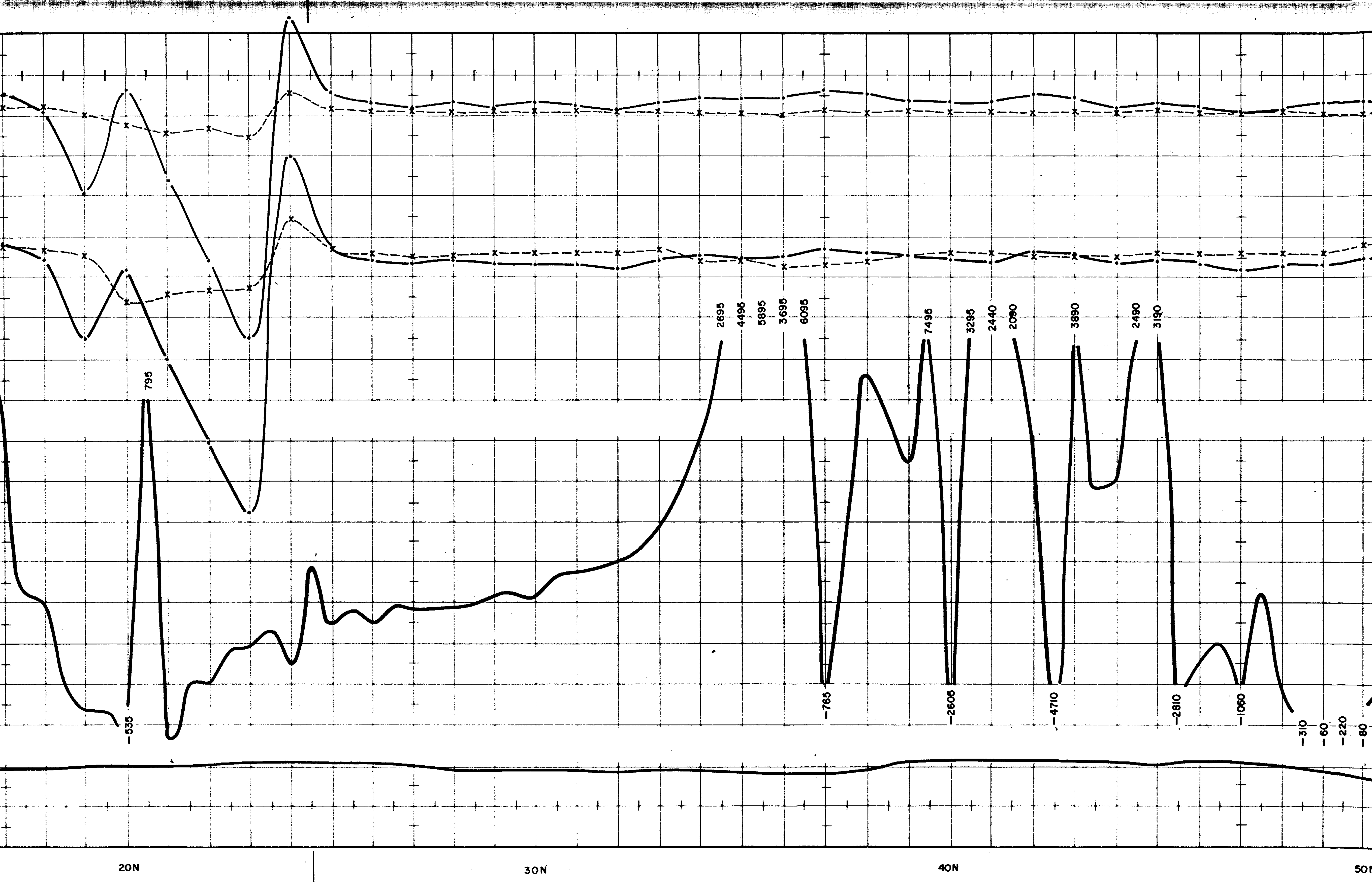
70N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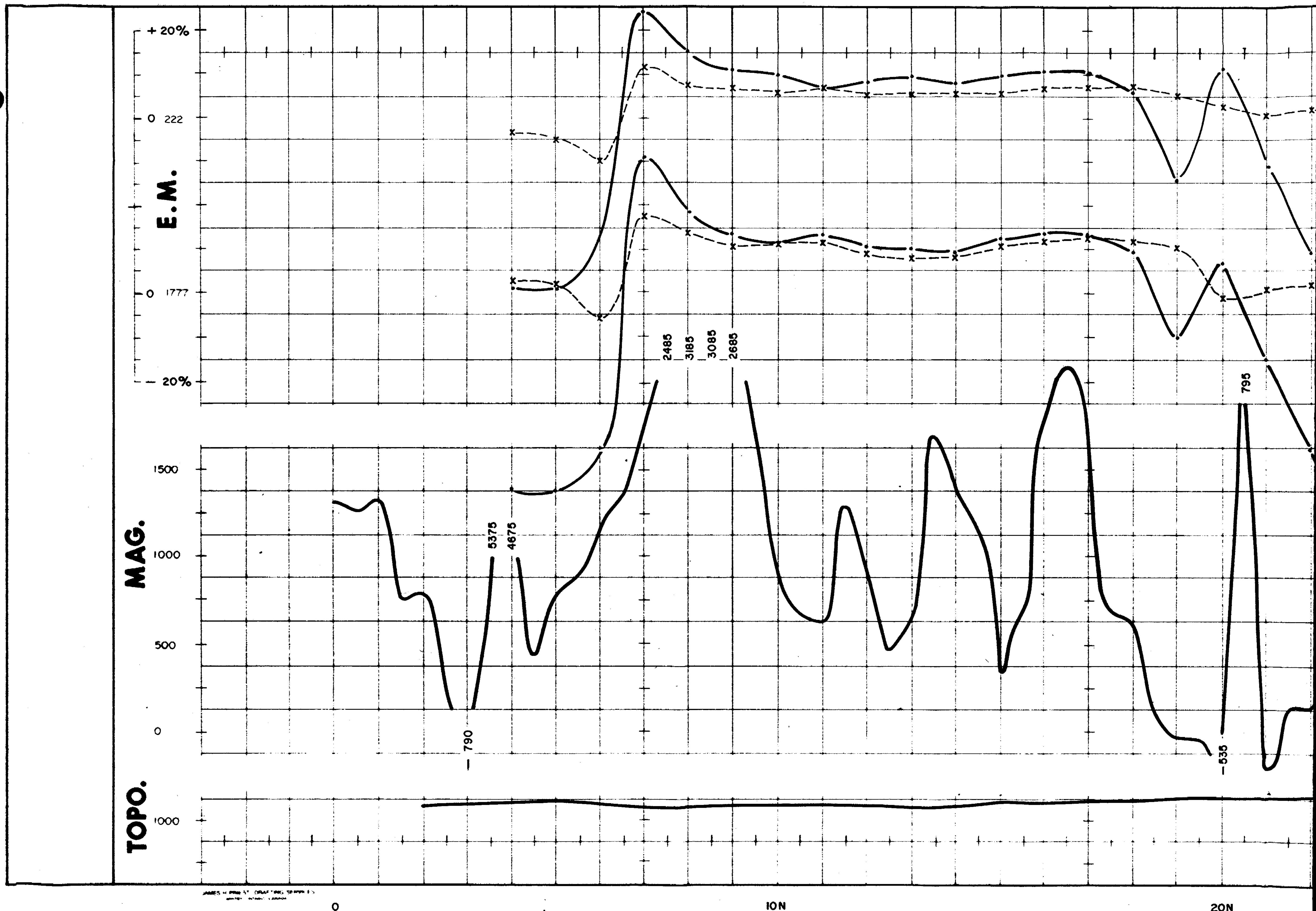
2695
4495
5895
3695
6095
7495
3295
2440
2090
3890
2490
3190
-765
-2605
-4710
-2810
-1060
-310
-60
-220
-80
20N
30N
40N
50N



E.M.
+ 20%
0 222
0 1777
− 20%
2485
3185
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2685
MAG.
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1000
500
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5375
4675
790
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535
TOPO.
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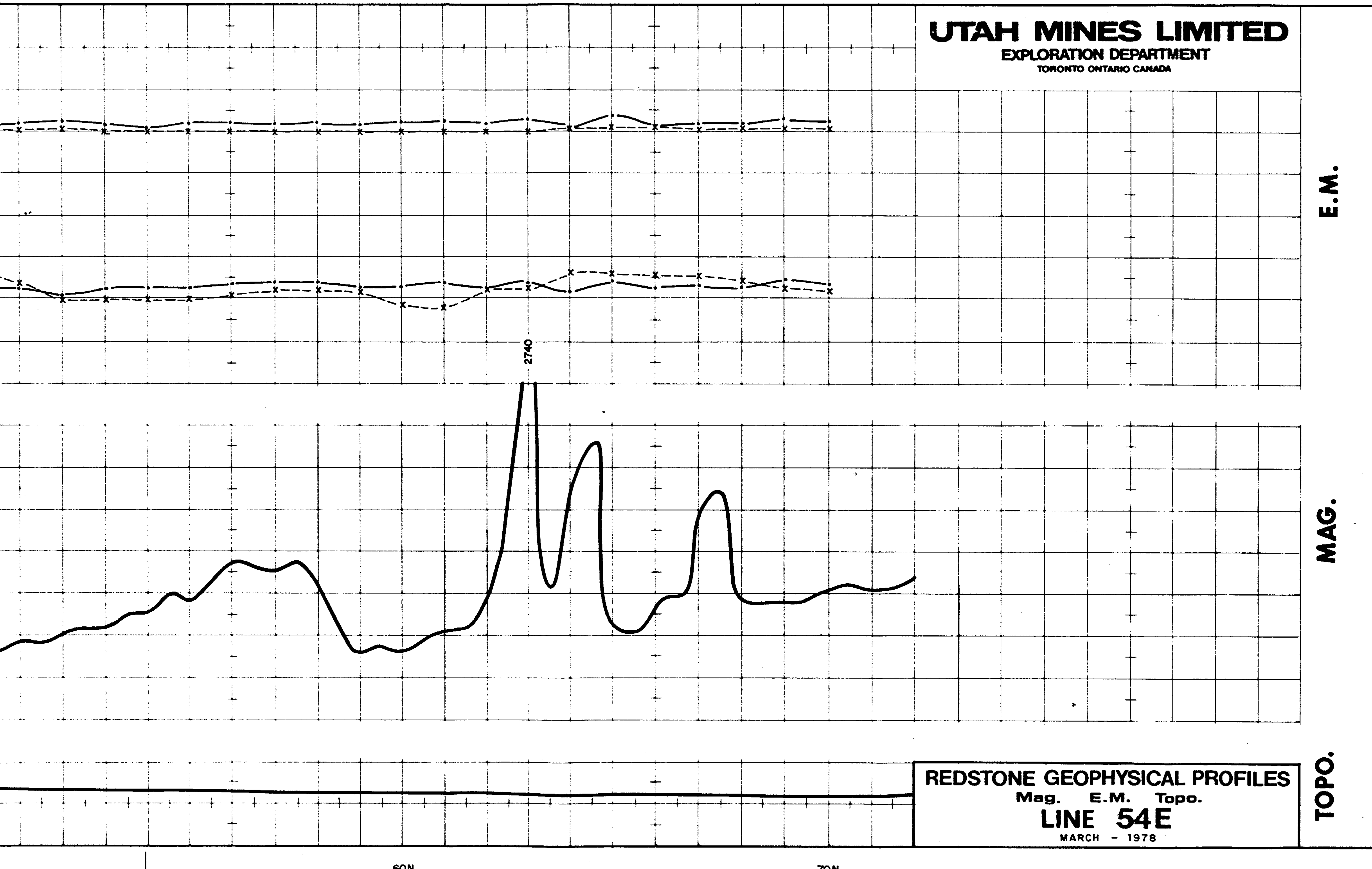


UTAH MINES LIMITED

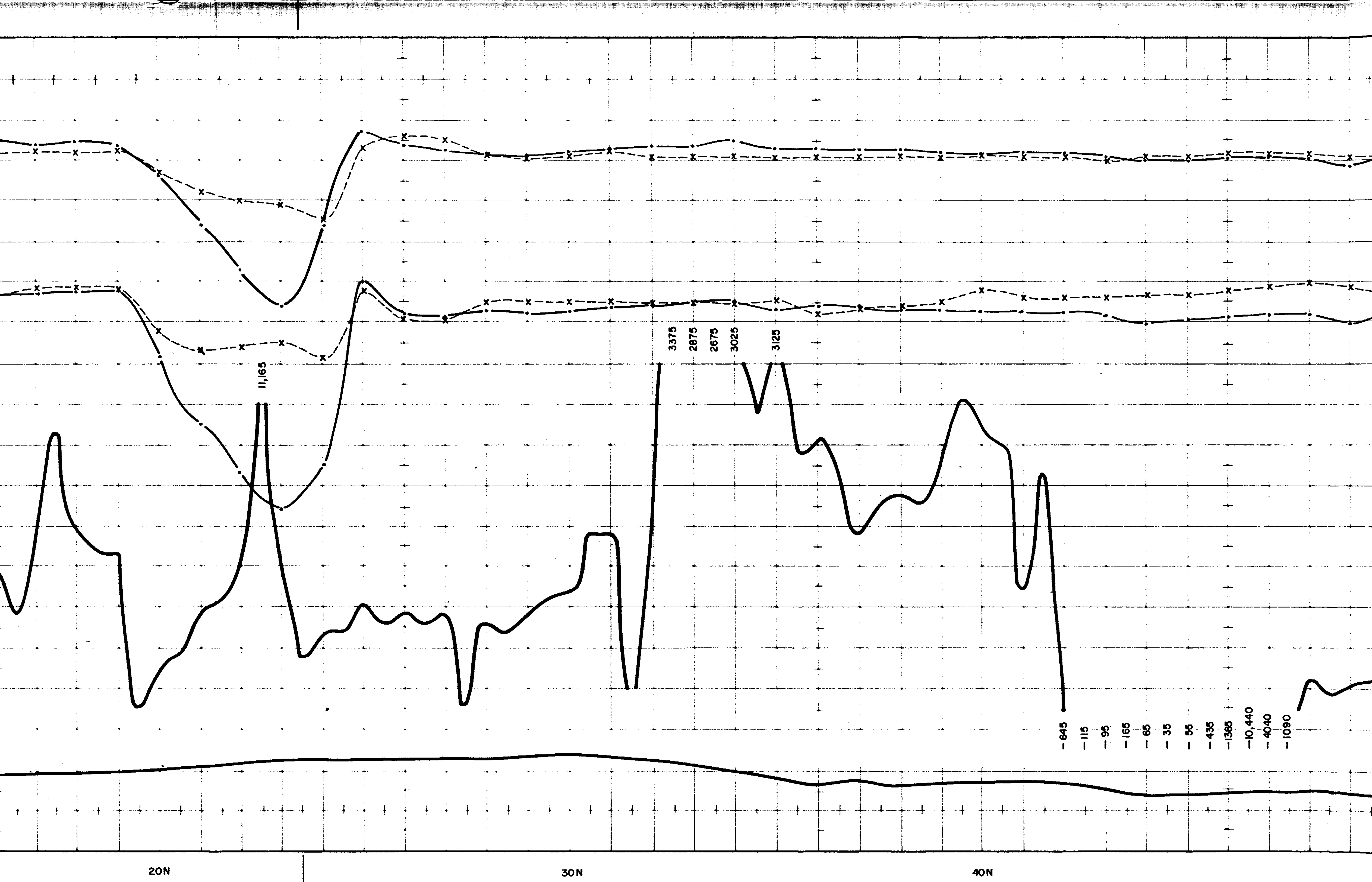
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA

REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

LINE 54E

MARCH - 1978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2675
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3125
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-95
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-65
-35
-55
-435
-1385
-10,440
-4040
-1090
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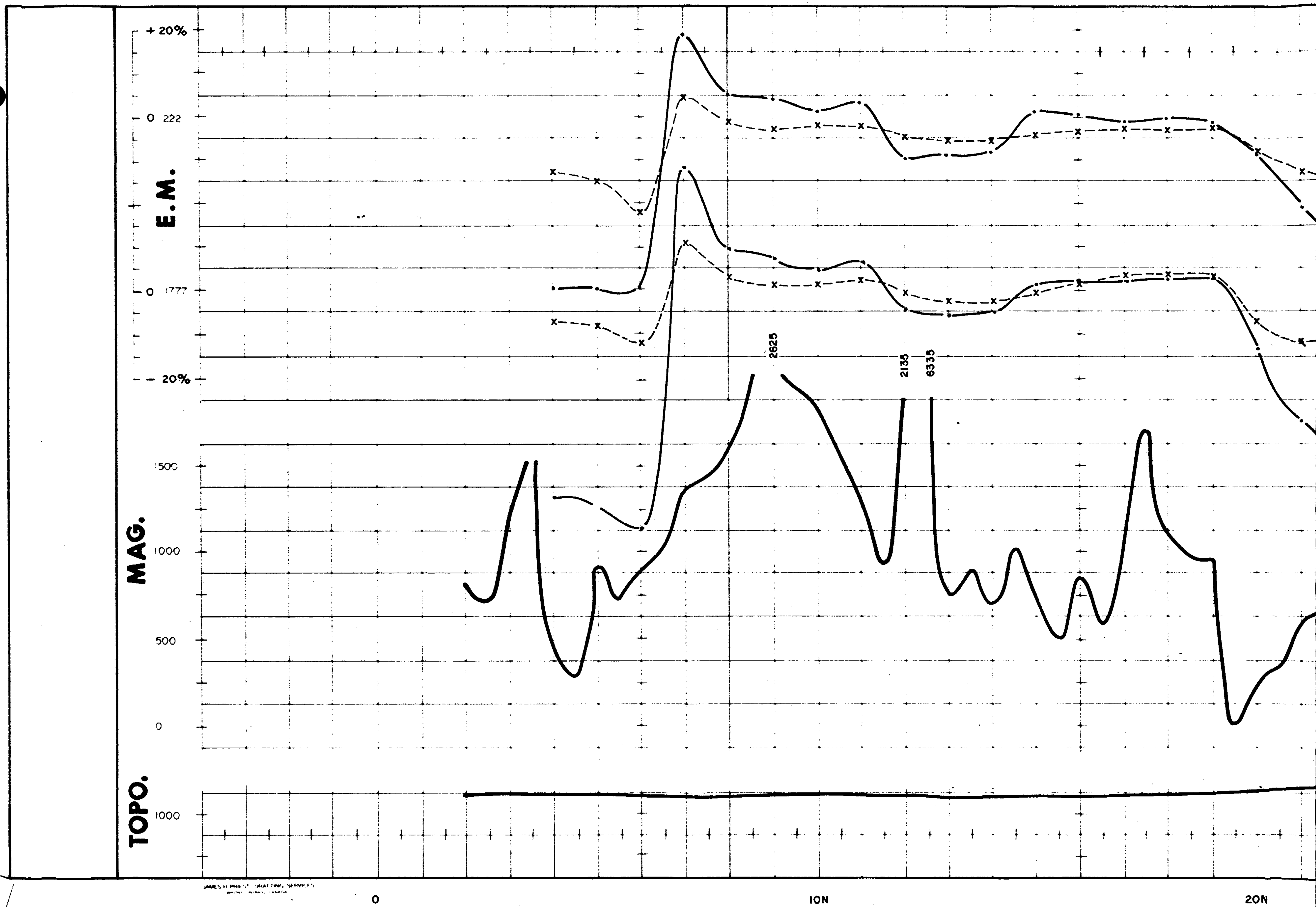
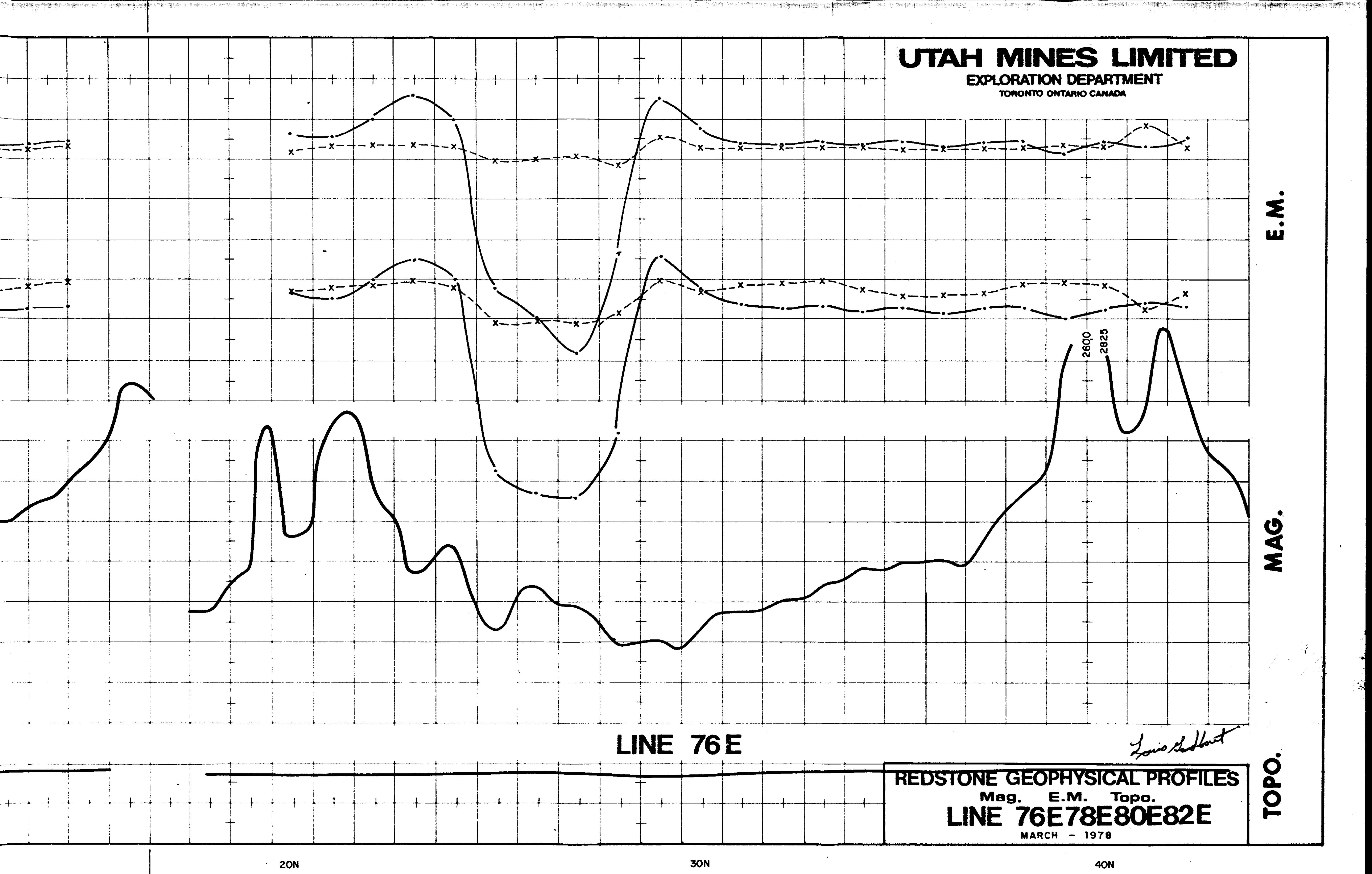
30N
40N



E.M.
+ 20%
0 222
0 1777
– 20%
2625
2135
6335
MAG.
1500
1000
500
0
TOPO.
1000
0
10N
20N


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
2600
2825
MAG.
LINE 76E
TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 76E78E80E82E
MARCH - 1978
20N
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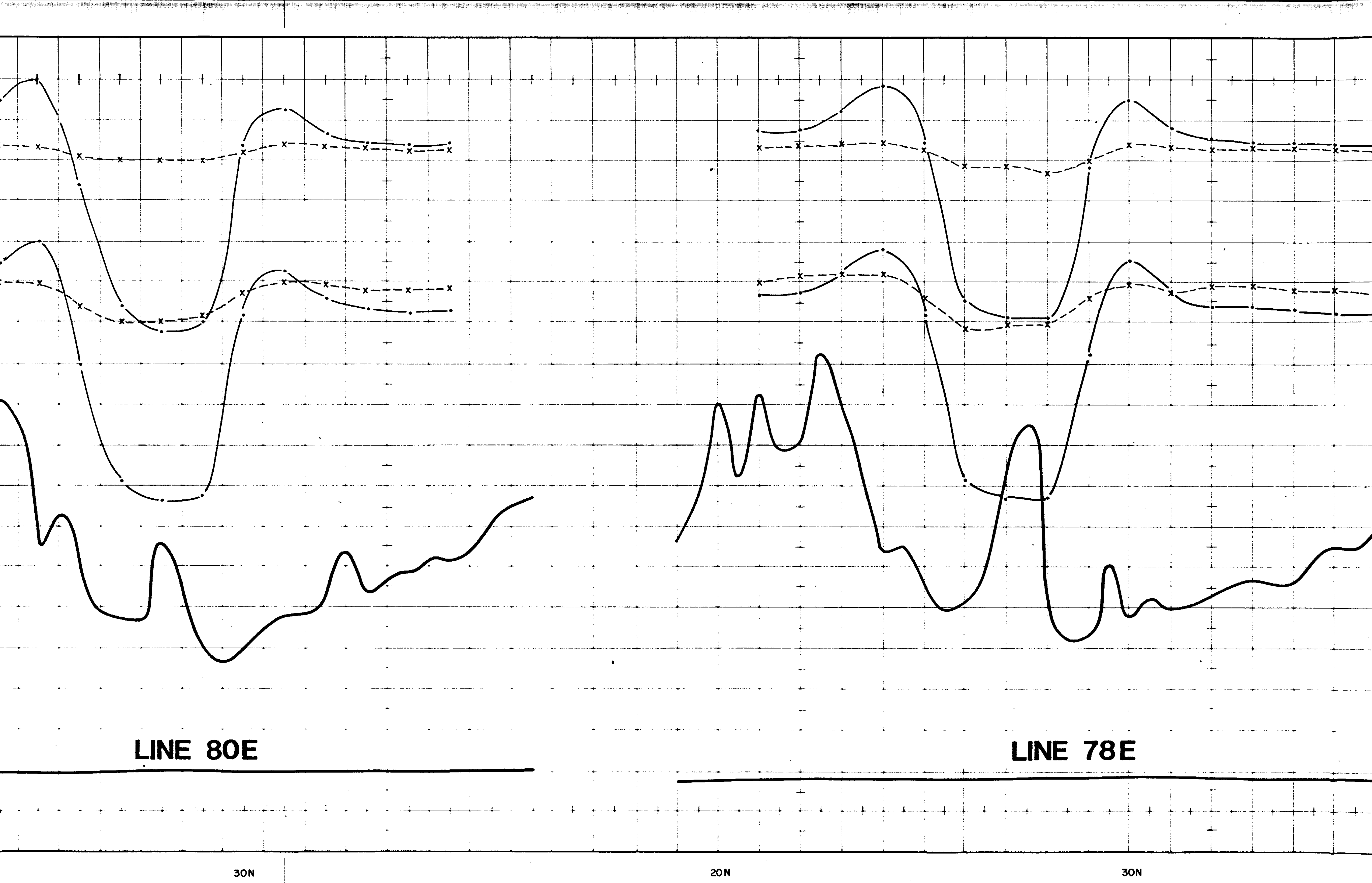
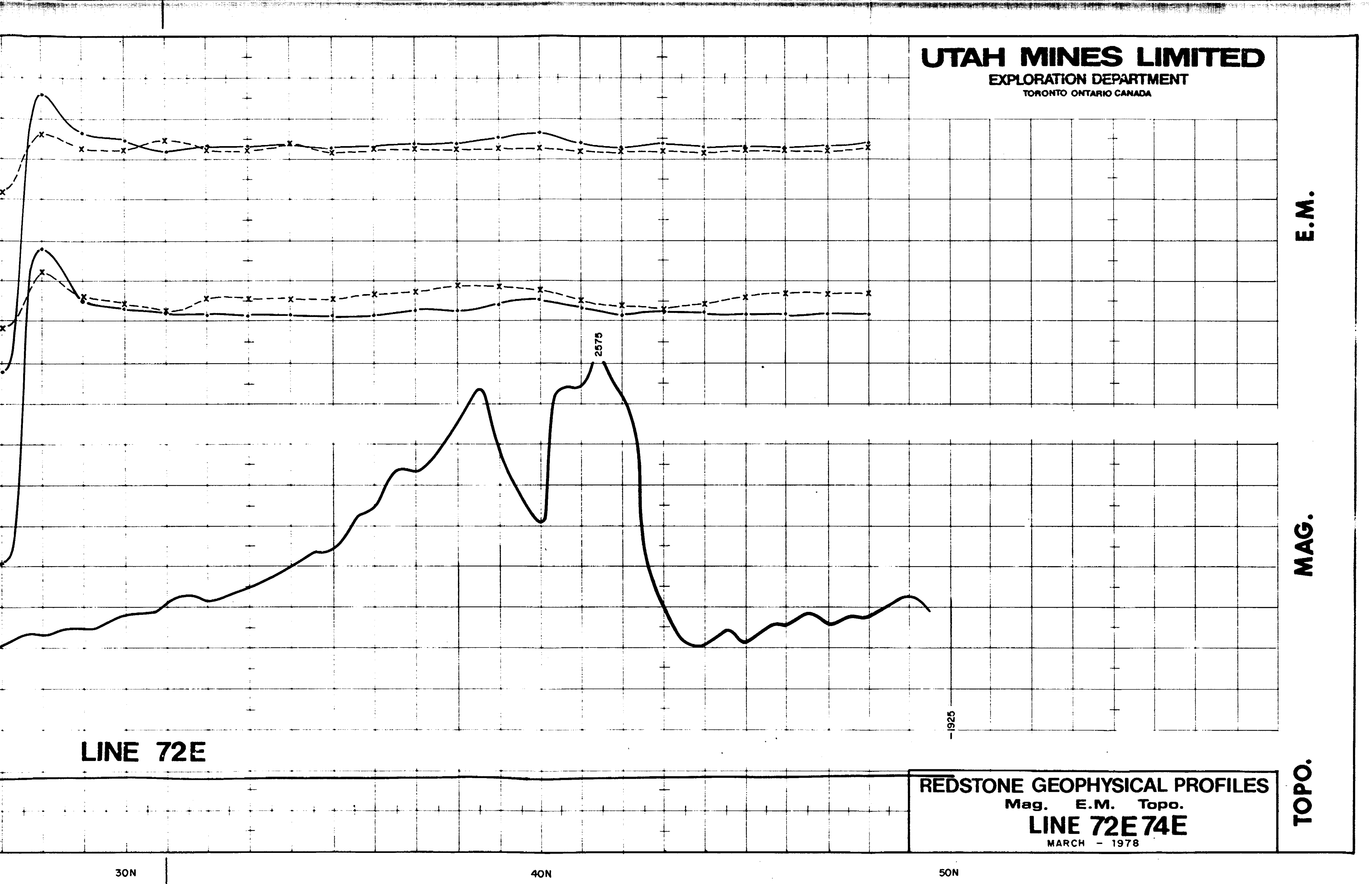
40N


LINE 80E
LINE 78E
30N
20N
30N

+ 20%
0 222
0 1777
- 20%
E.M.
4900
5300
3500
6500
3200
1500
1000
500
0
MAG.
LINE 82E
LINE
TOPO.
1000
20N
30N
20N



UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
MAG.
TOPO.
2575
1925
LINE 72E
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 72E 74E
MARCH - 1978
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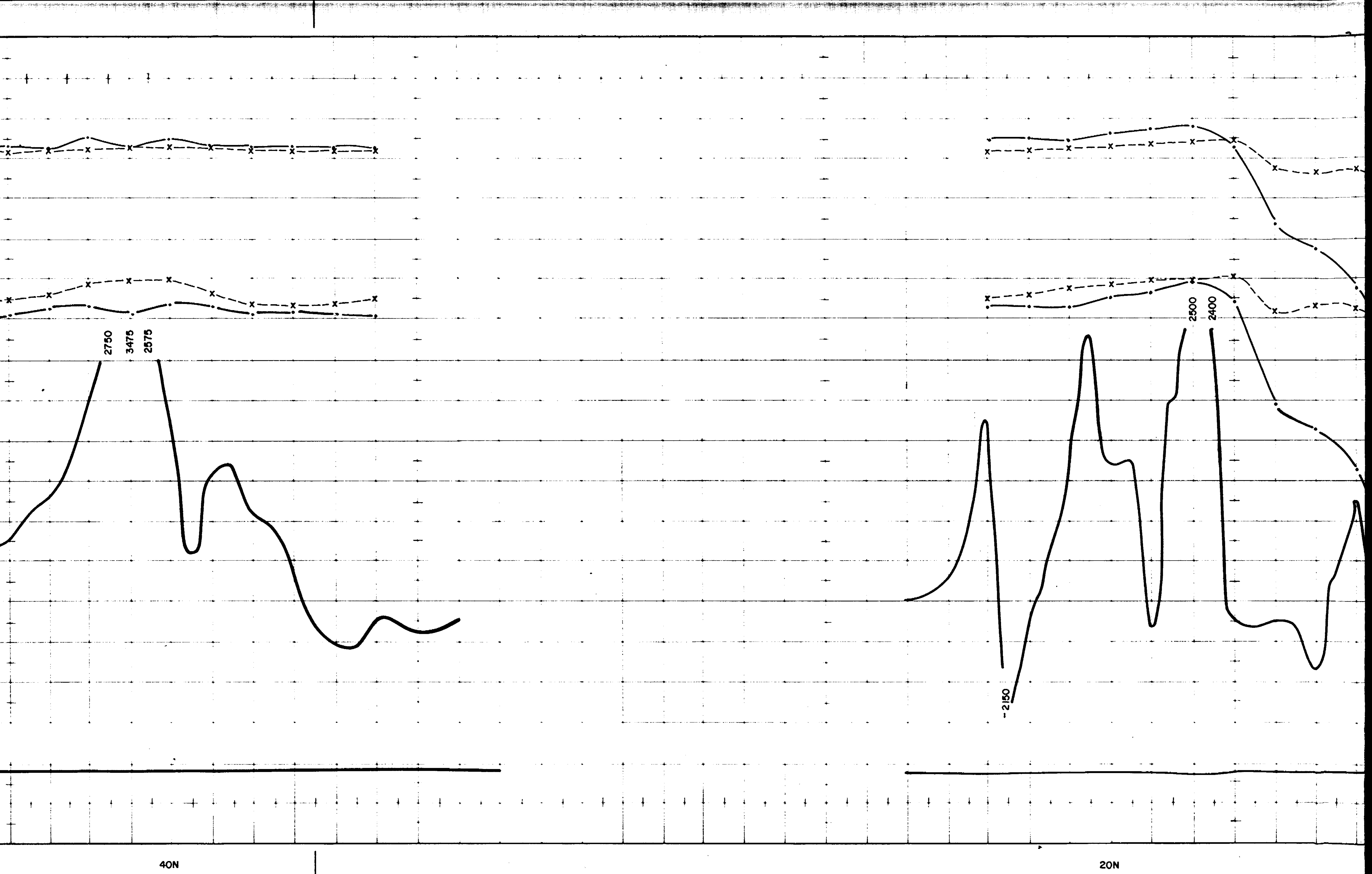
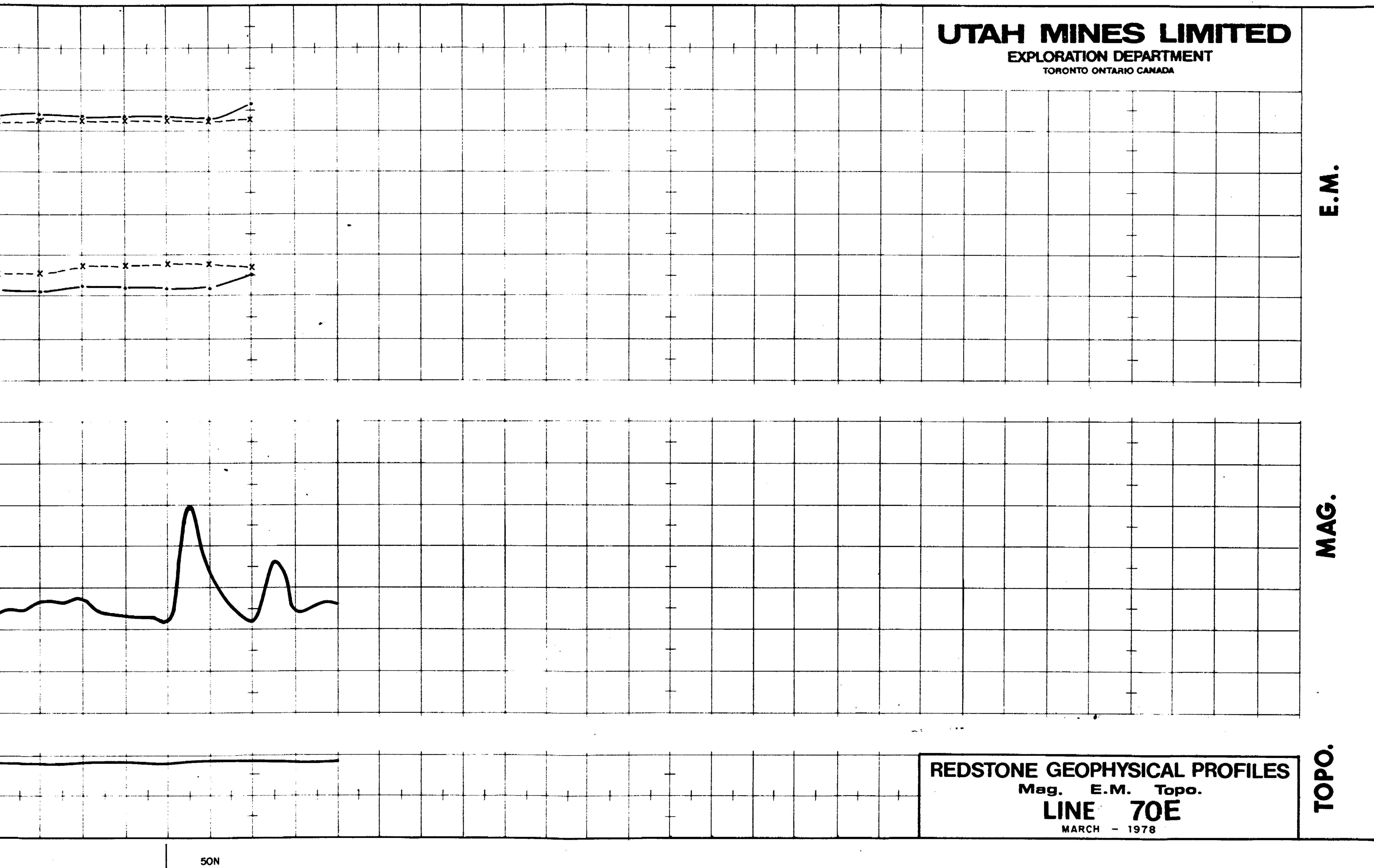
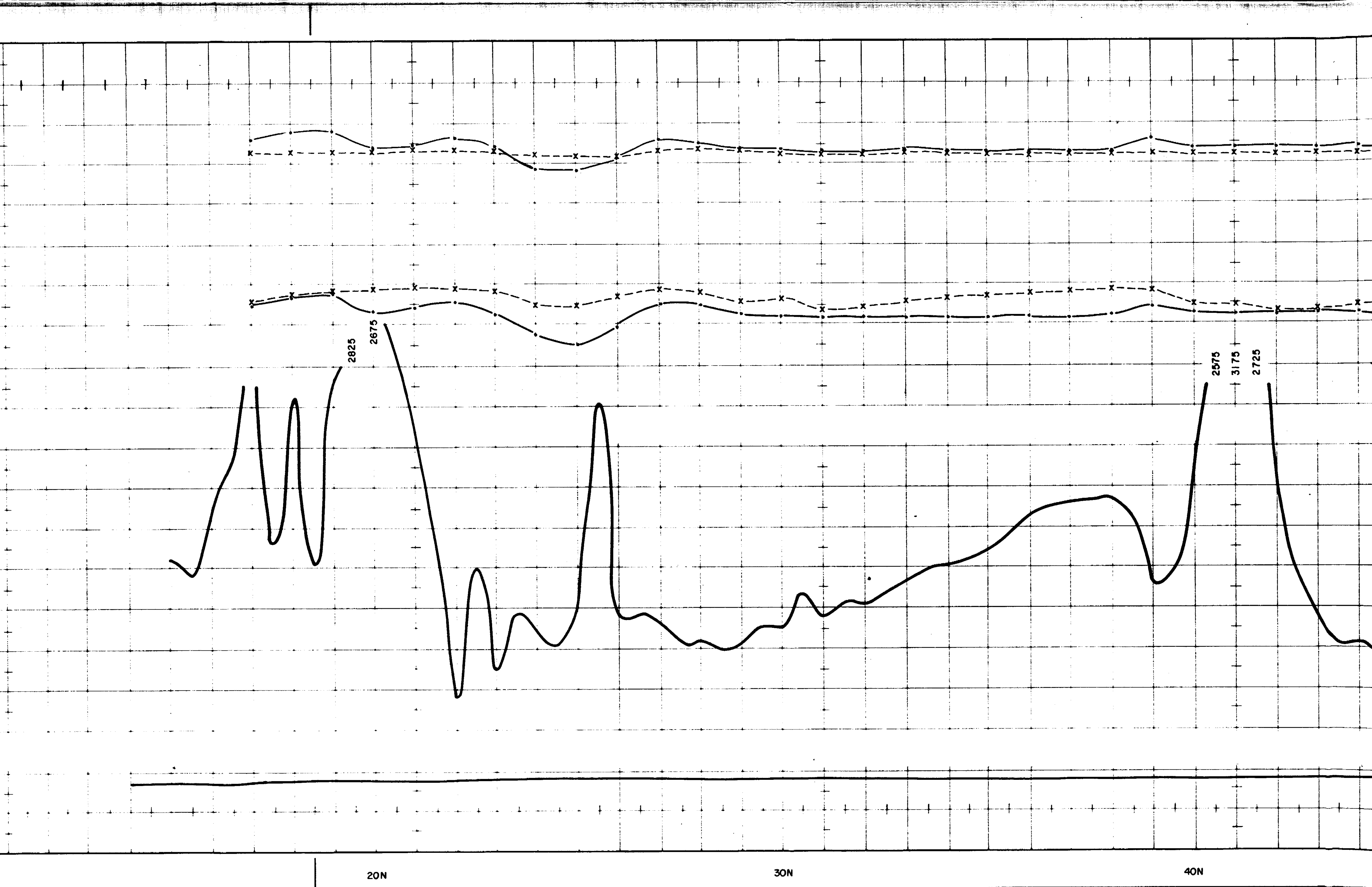

2750
3475
2575
2500
2400
-2150
40N
20N

+ 20%
0 222
E.M.
0 1777
- 20%
2700
2750
3475
2575
MAG.
1500
1000
500
0
17.25
LINE 74E
TOPO.
1000
20N
30N
40N



UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA

REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 70E
MARCH - 1978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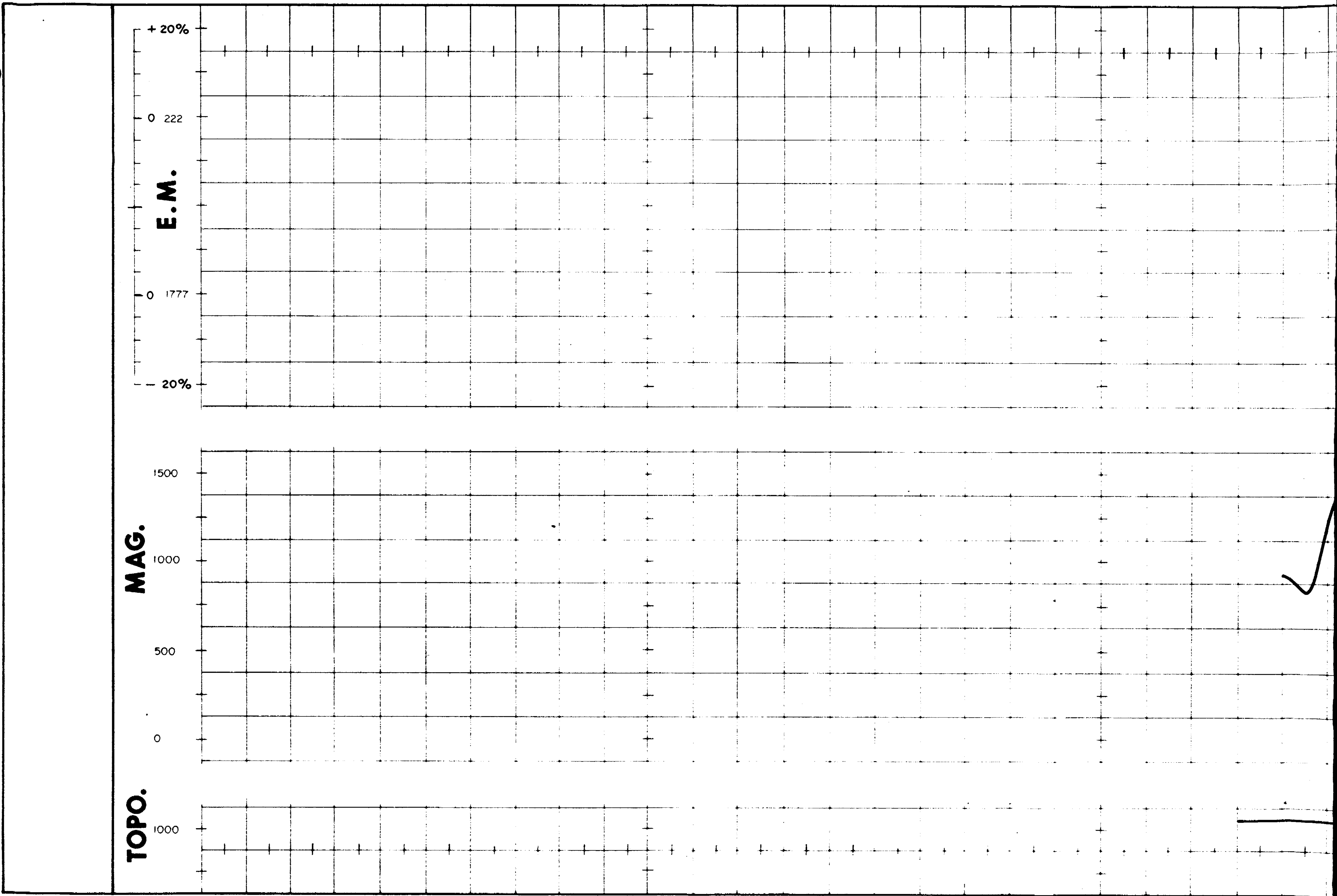
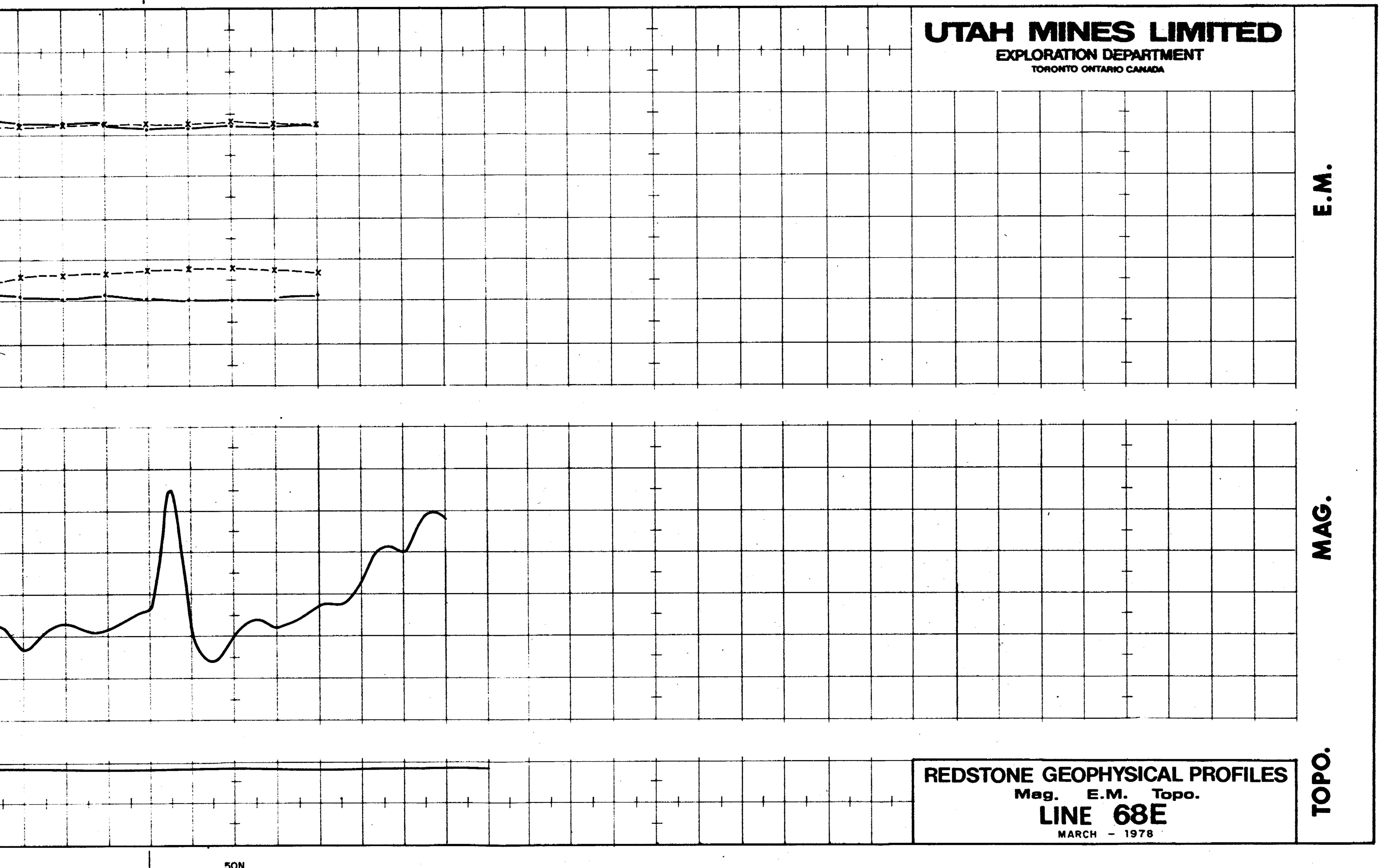
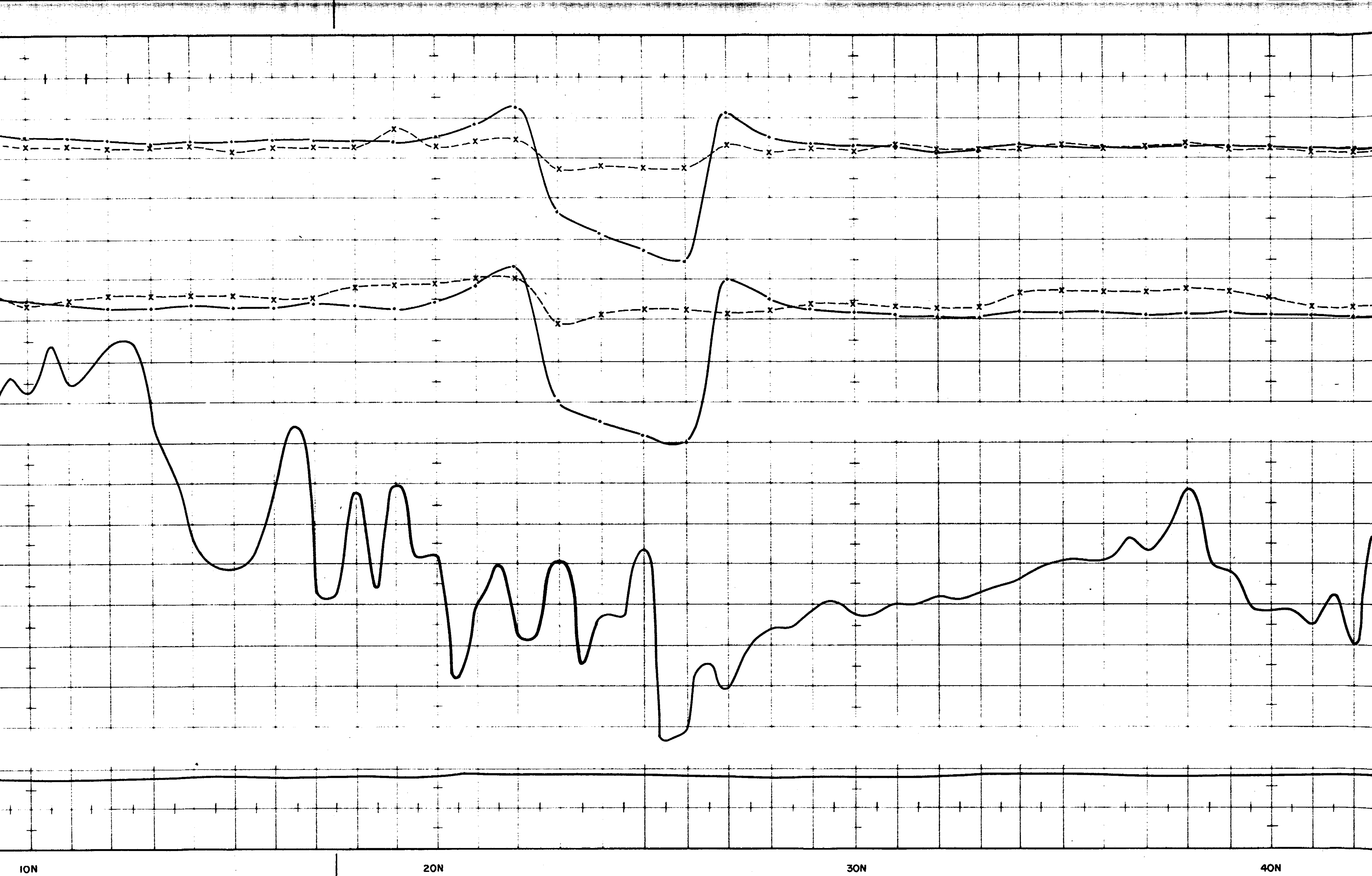
2575
3175
2725
20N
30N
40N


+ 20%
0 222
E.M.
0 1777
- 20%
MAG.
1500
1000
500
0
TOPO.
1000


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
MAG.
TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 68E
MARCH - 1978
50N


10N
20N
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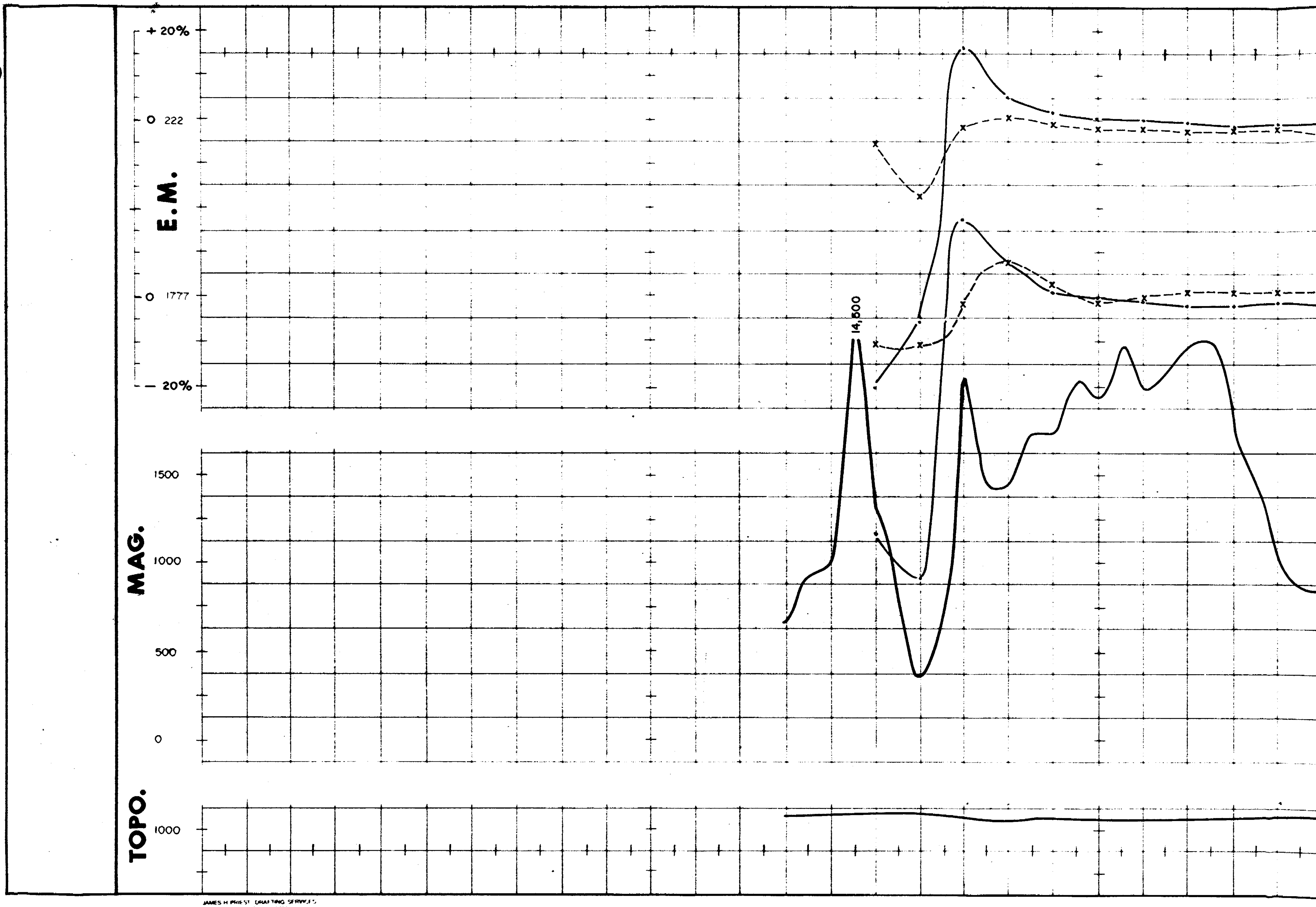
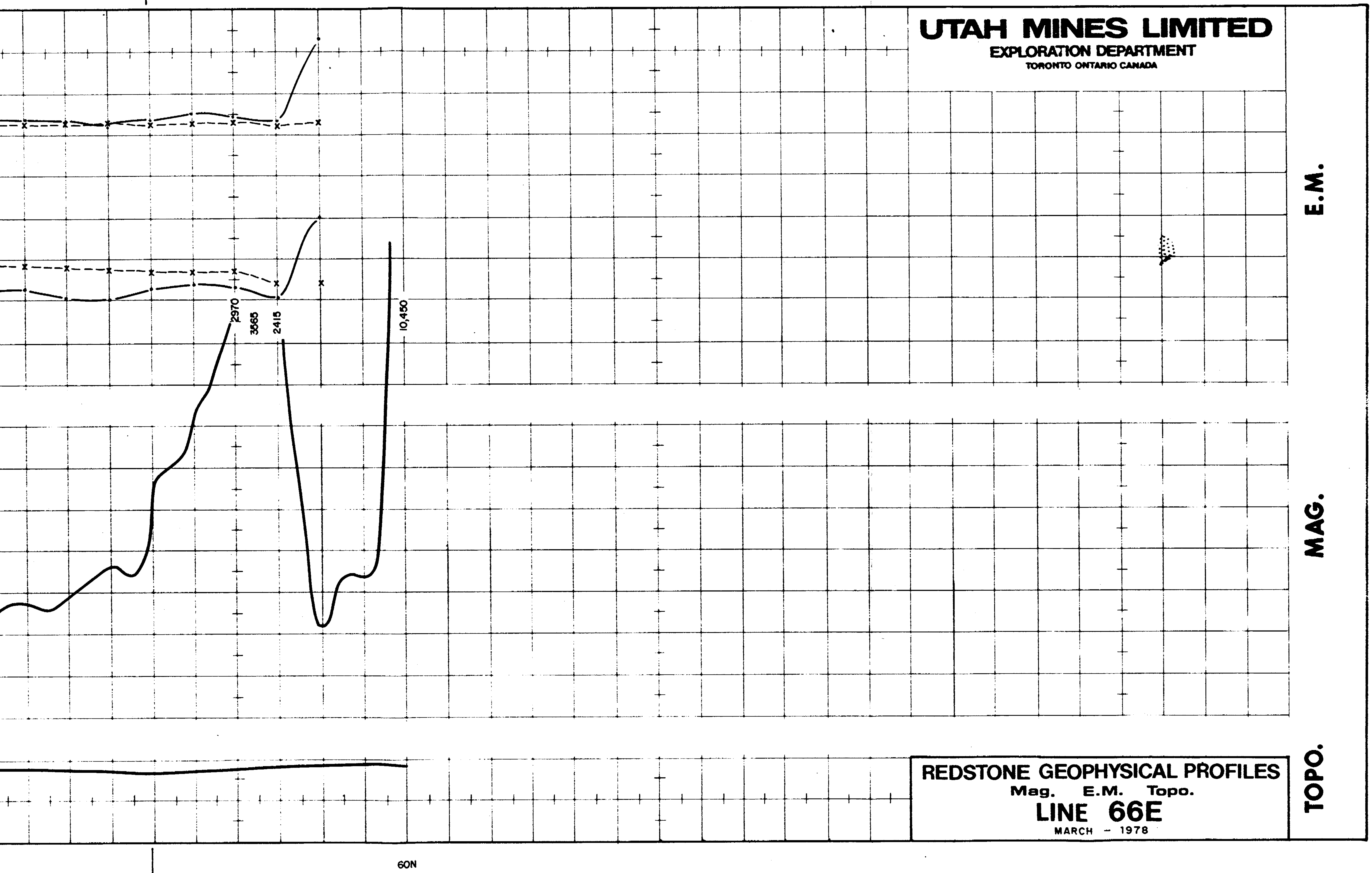

+ 20%
O 222
E.M.
O 1777
– 20%
14,500
MAG.
1500
1000
500
0
TOPO.
1000
JAMES H PRIEST DRAFTING SERVICES

ION


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
2970
3565
2415
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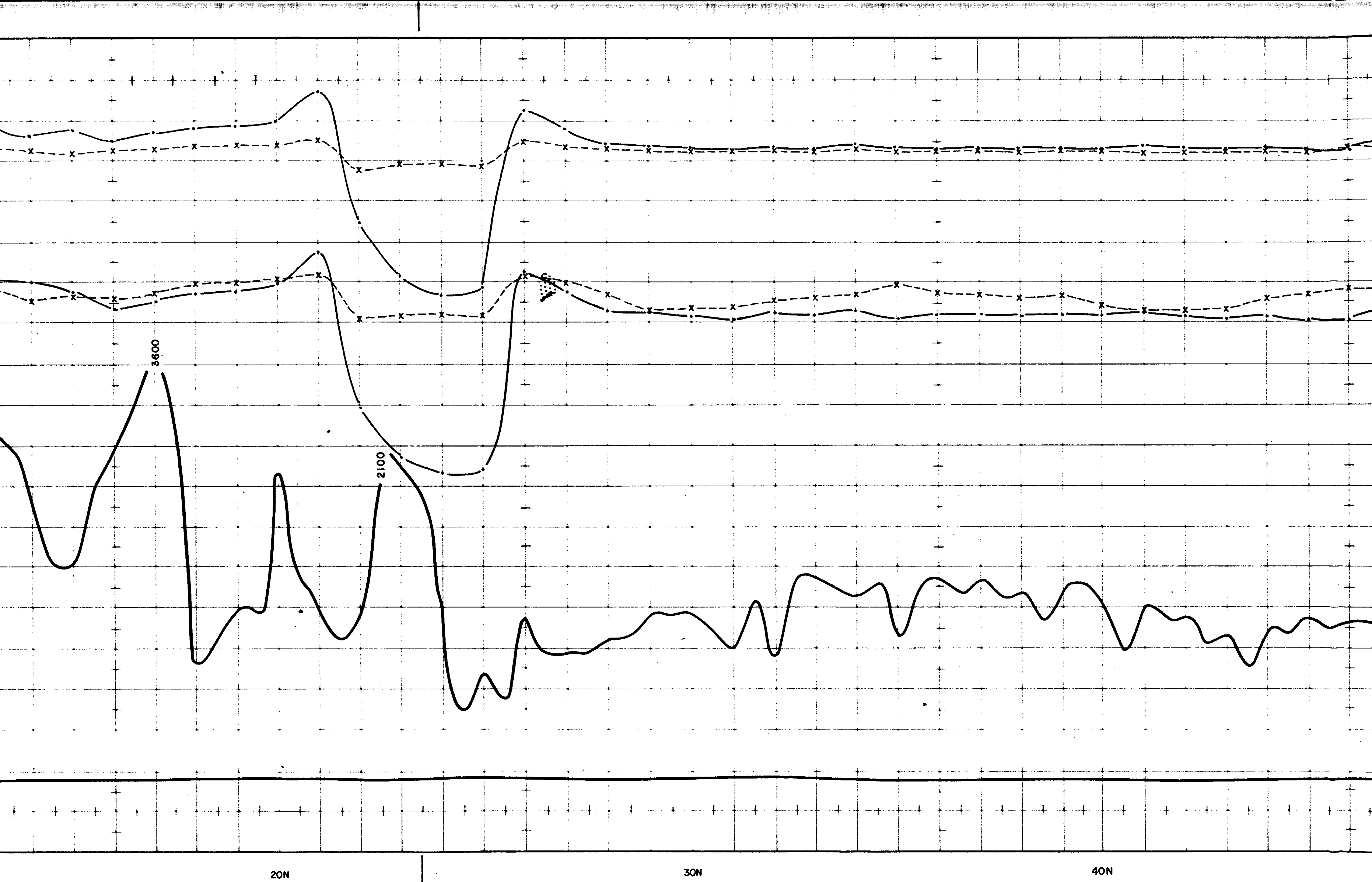
MAG.
TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 66E
MARCH - 1978
60N



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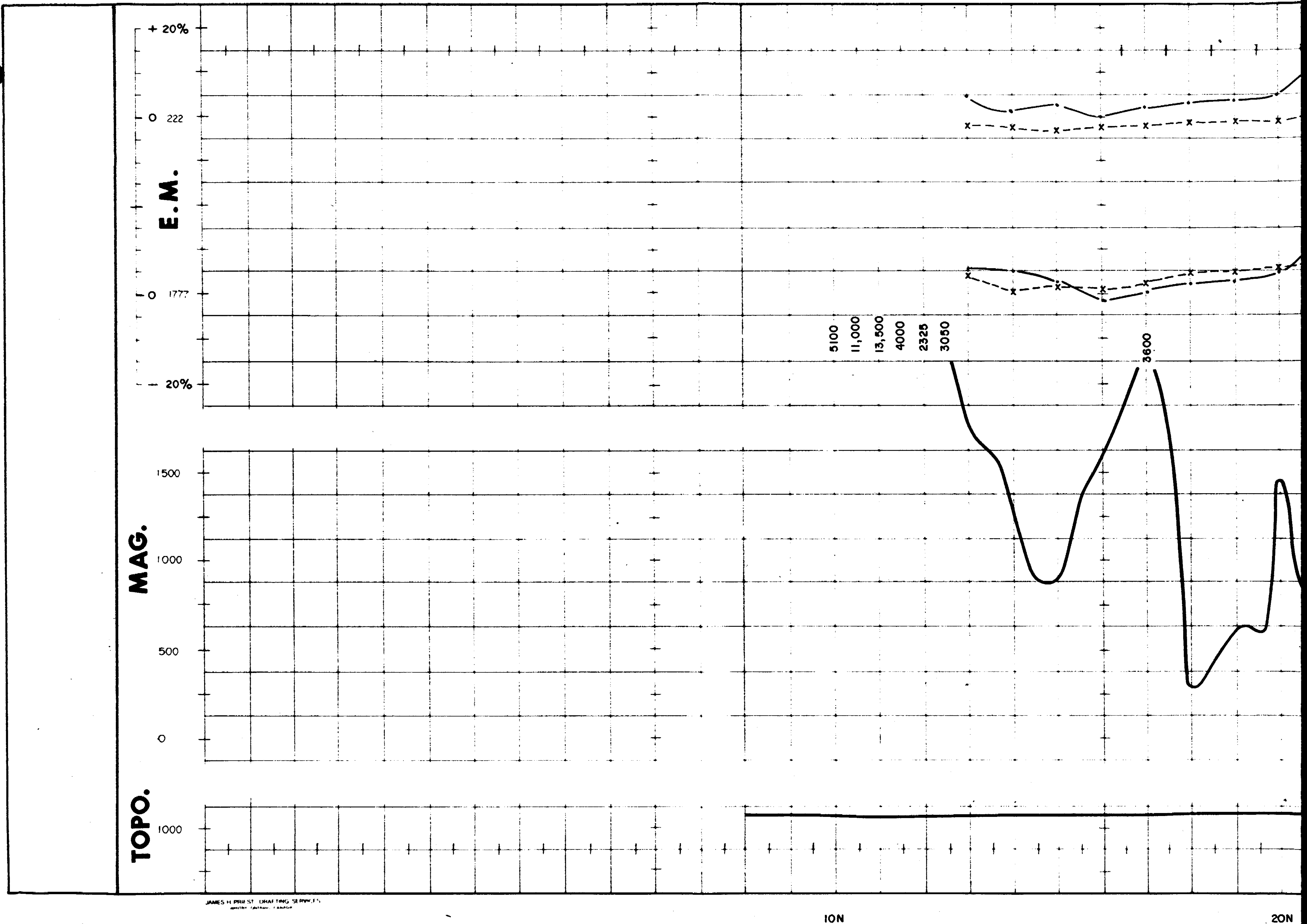
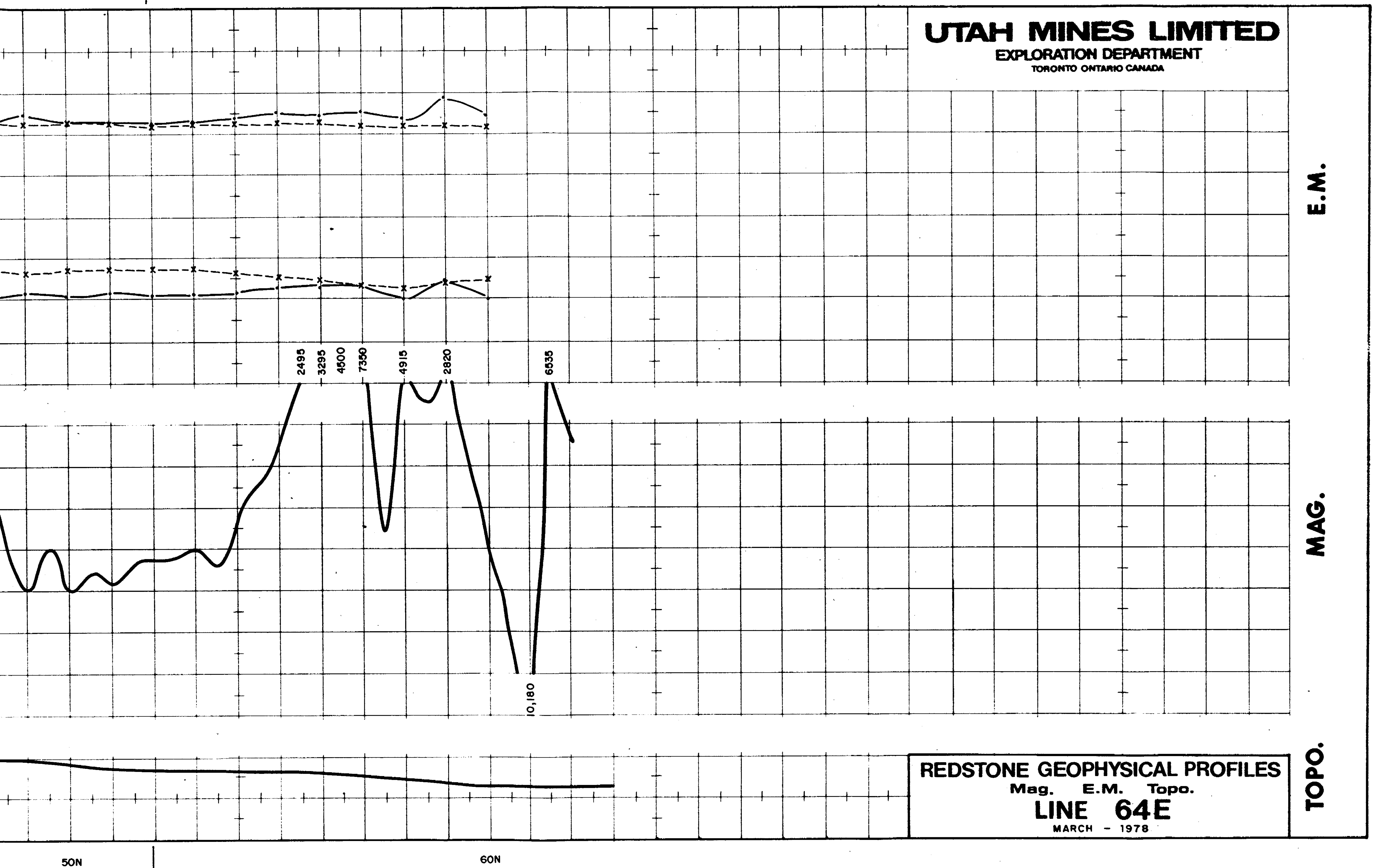
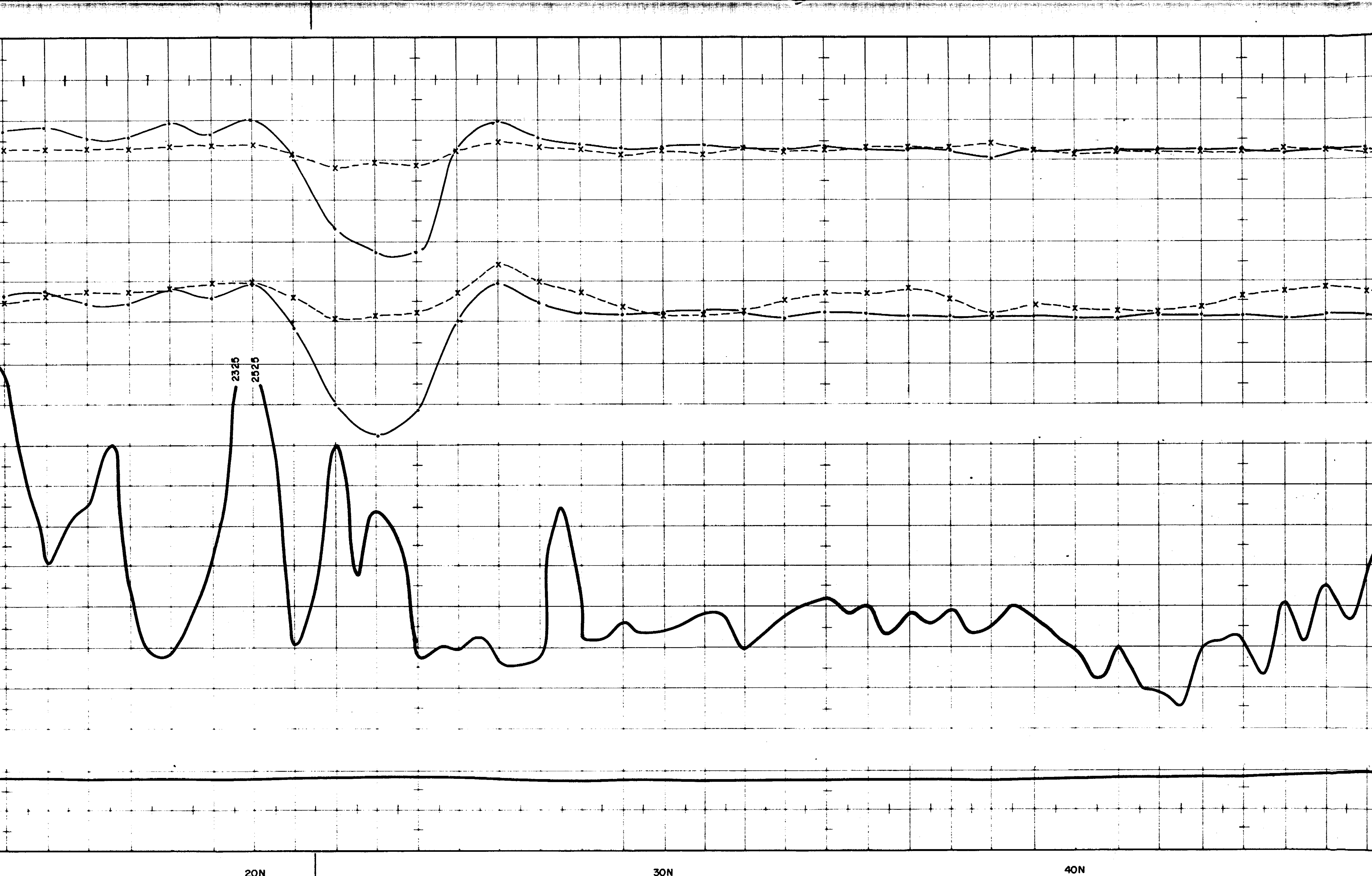
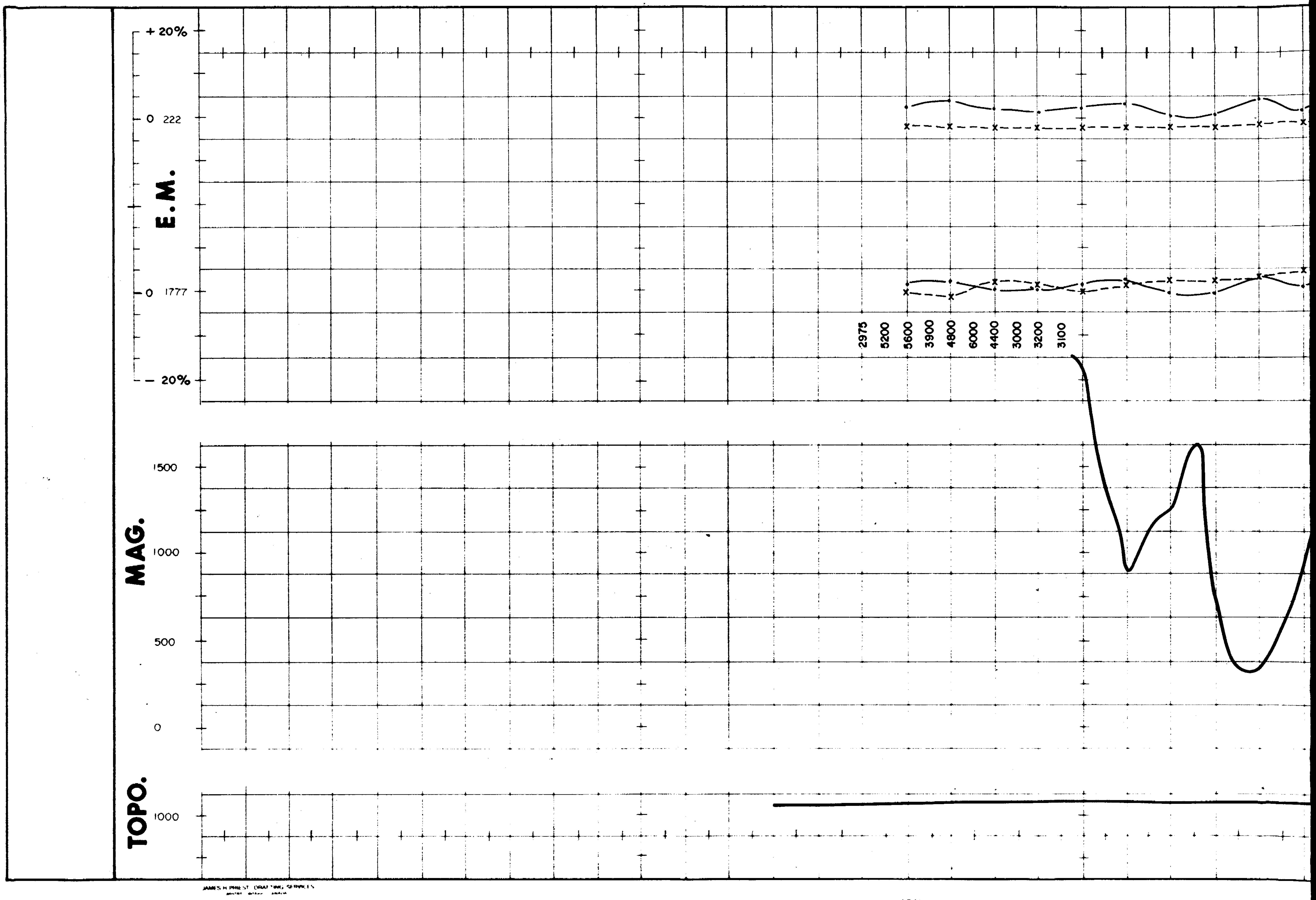

+ 20%
0 222
E.M.
0 1777
– 20%
5100
11,000
13,500
4000
2325
3050
3600
MAG.
1500
1000
500
0
TOPO.
1000
JAMES H. PRIEST DRAFTING SERVICES
10N
20N

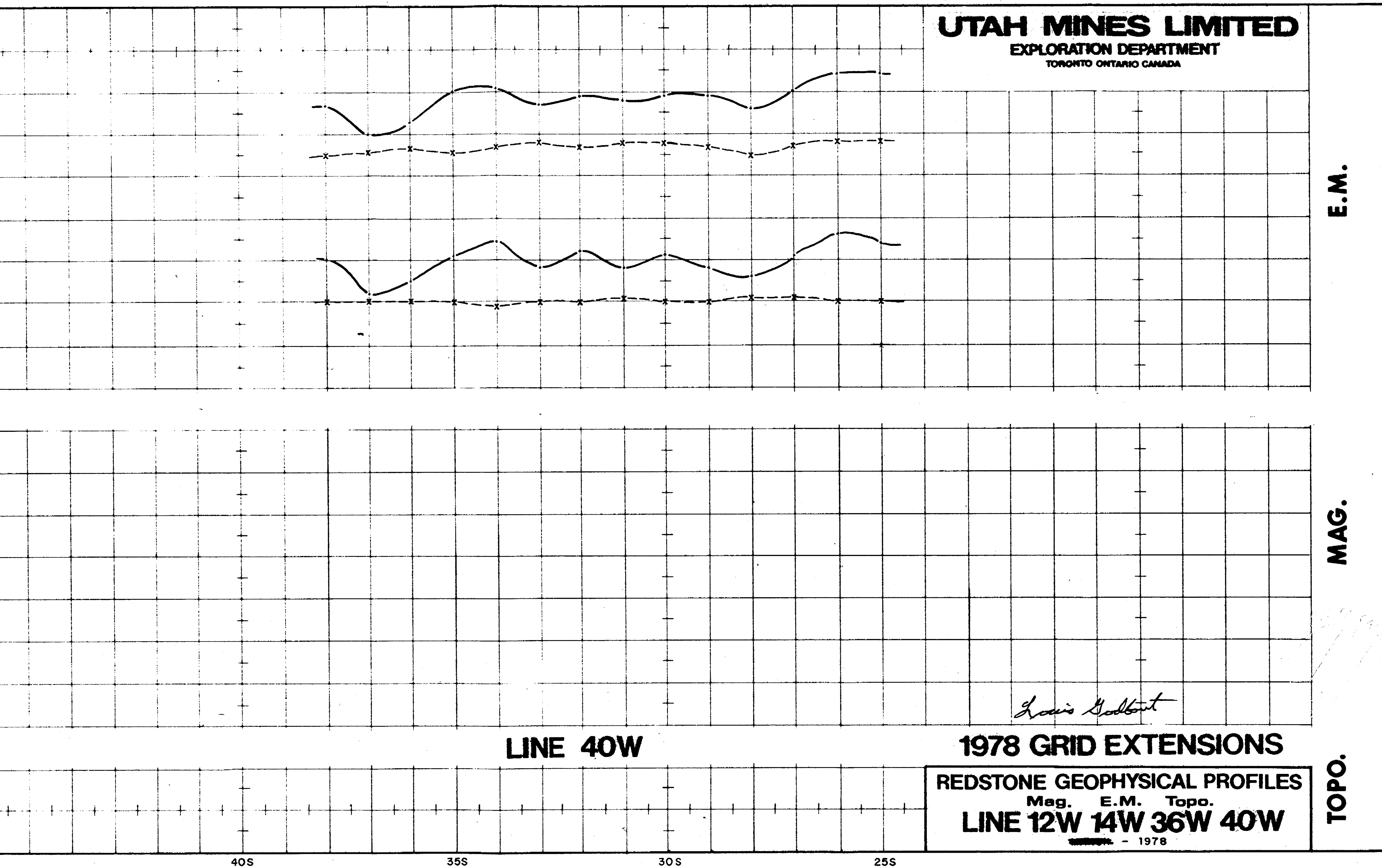

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
MAG.
TOPO.
2495
3295
4500
7350
4915
2820
6535
10,180
50N
60N
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 64E
MARCH - 1978

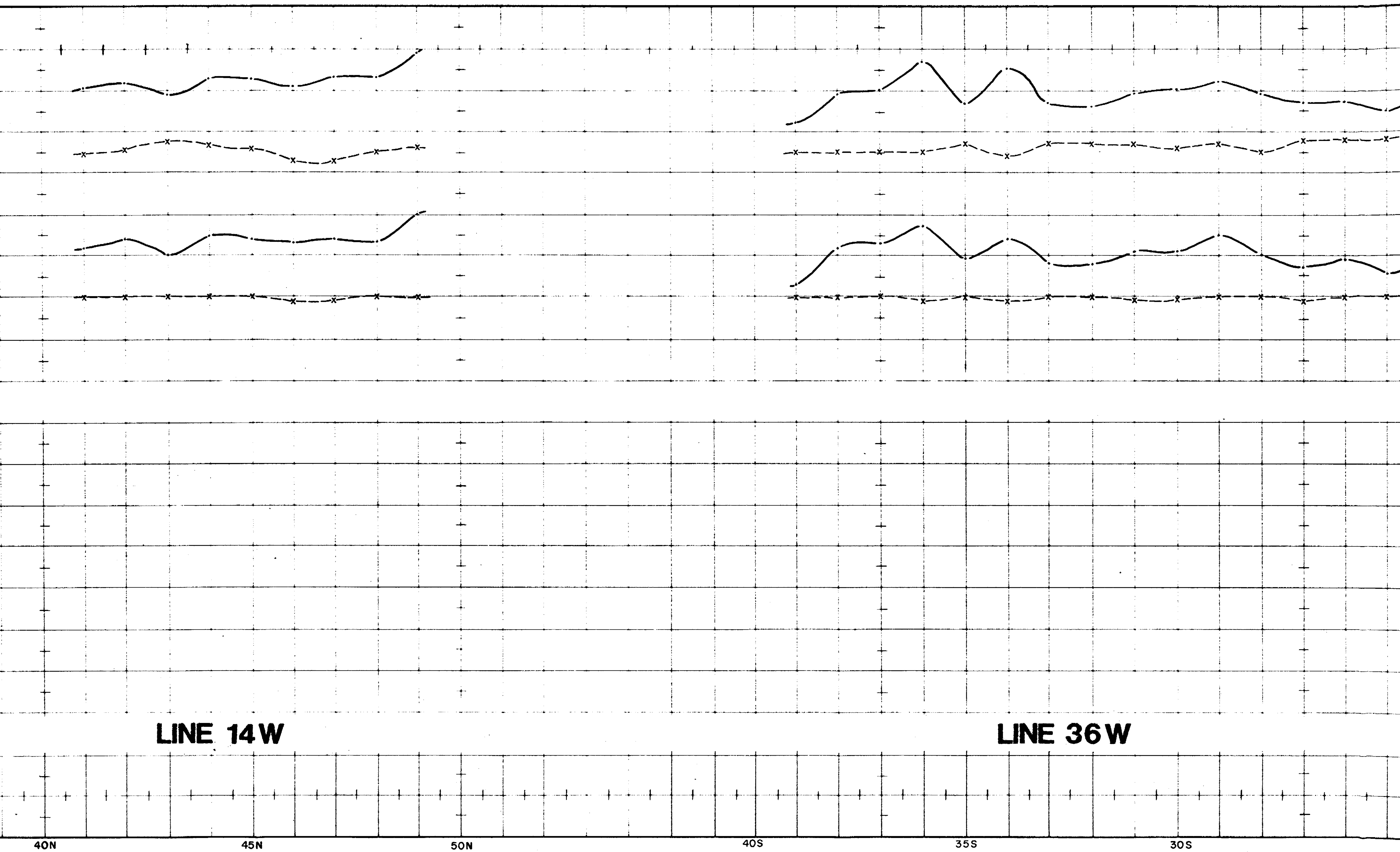

2325
2525
20N
30N
40N

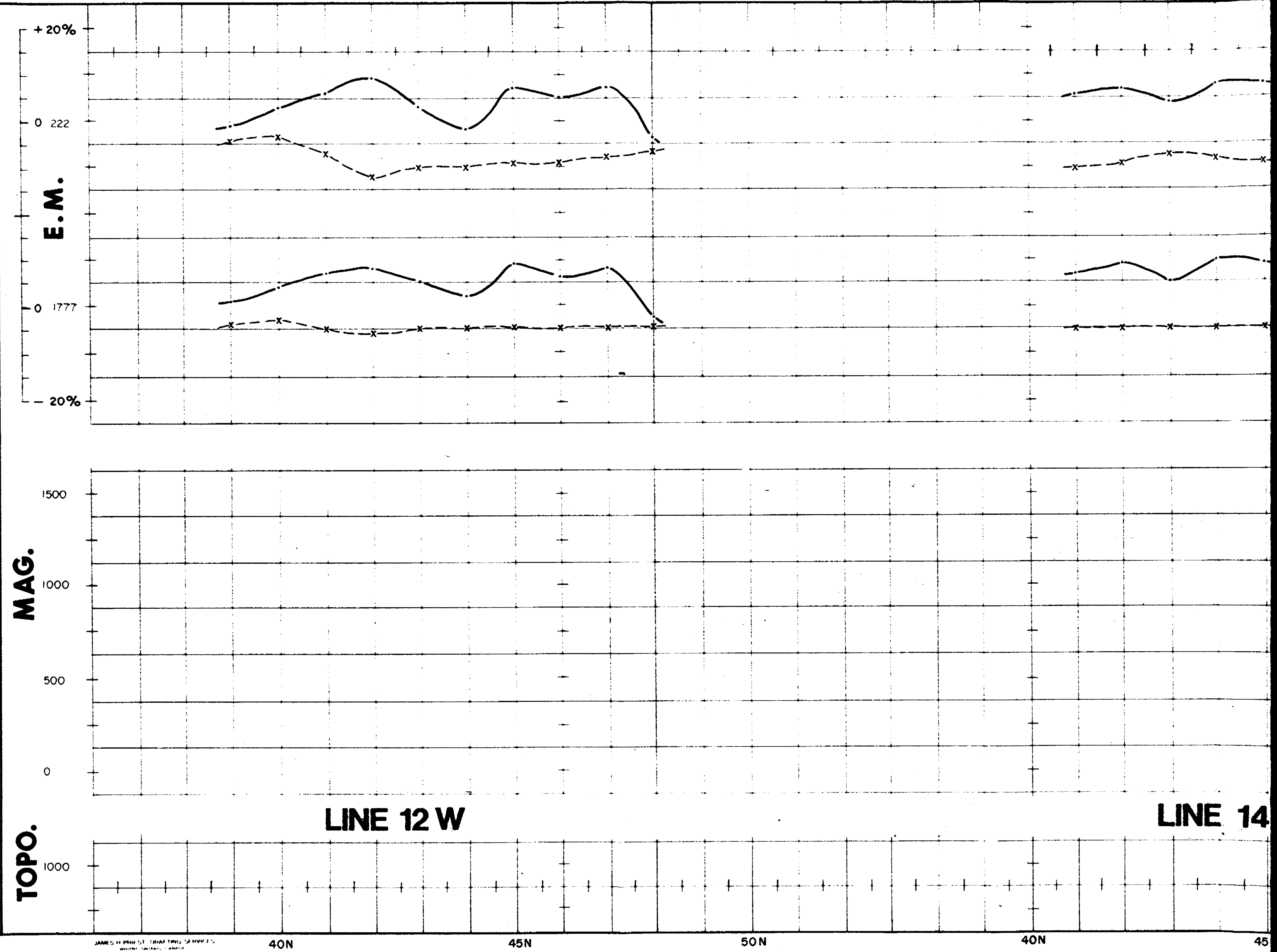


E.M.
+ 20%
0 222
0 1777
– 20%
2975
5200
5600
3900
4800
6000
4400
3000
3200
3100
MAG.
1500
1000
500
0
TOPO.
1000
JAMES H. PRIEST DRAFTING SERVICES

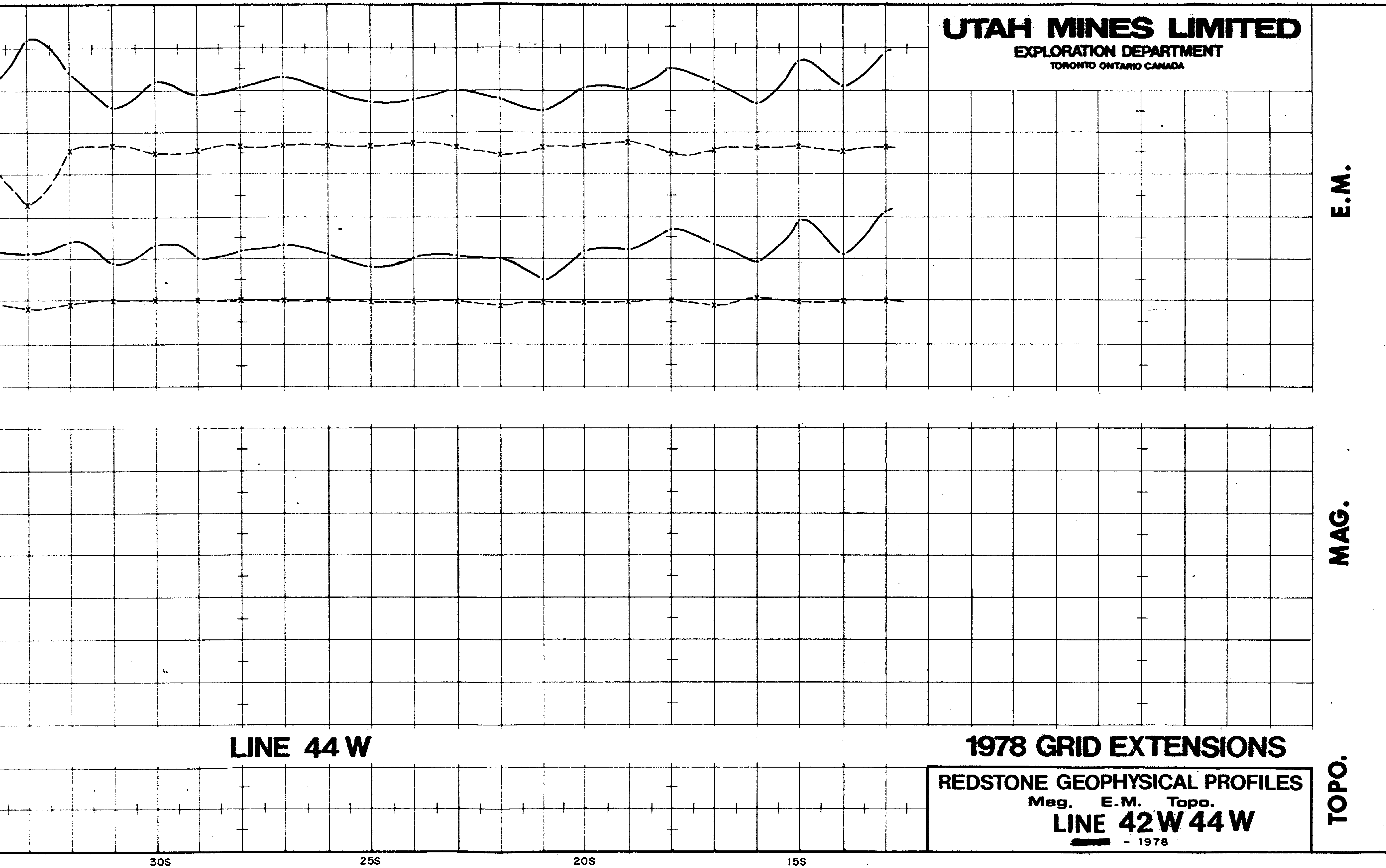
ION

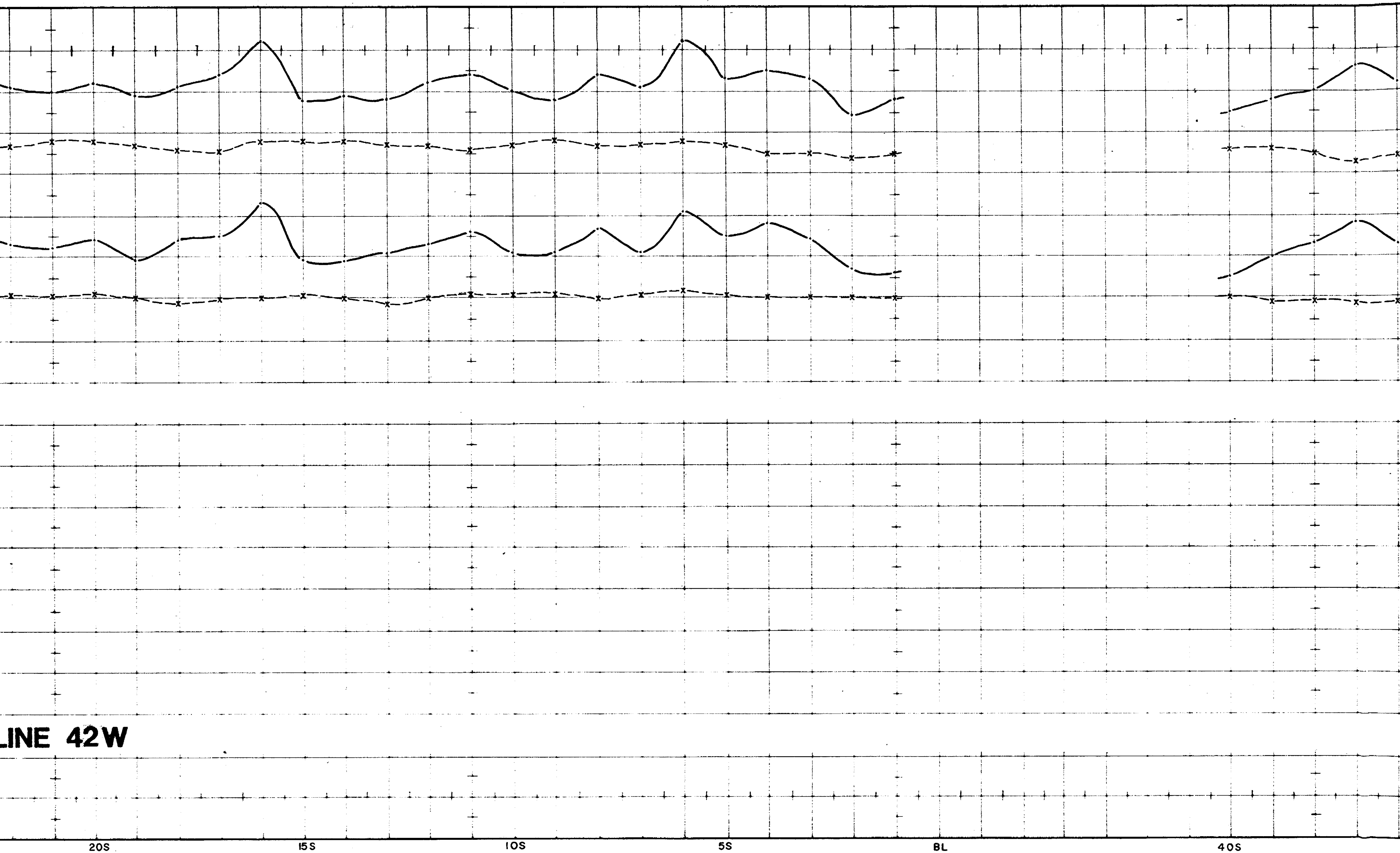

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
MAG.
LINE 40W
1978 GRID EXTENSIONS
TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 12W 14W 36W 40W
[redacted] - 1978
40S
35S
30S
25S


LINE 14W
LINE 36W
40N
45N
50N
40S
35S
30S

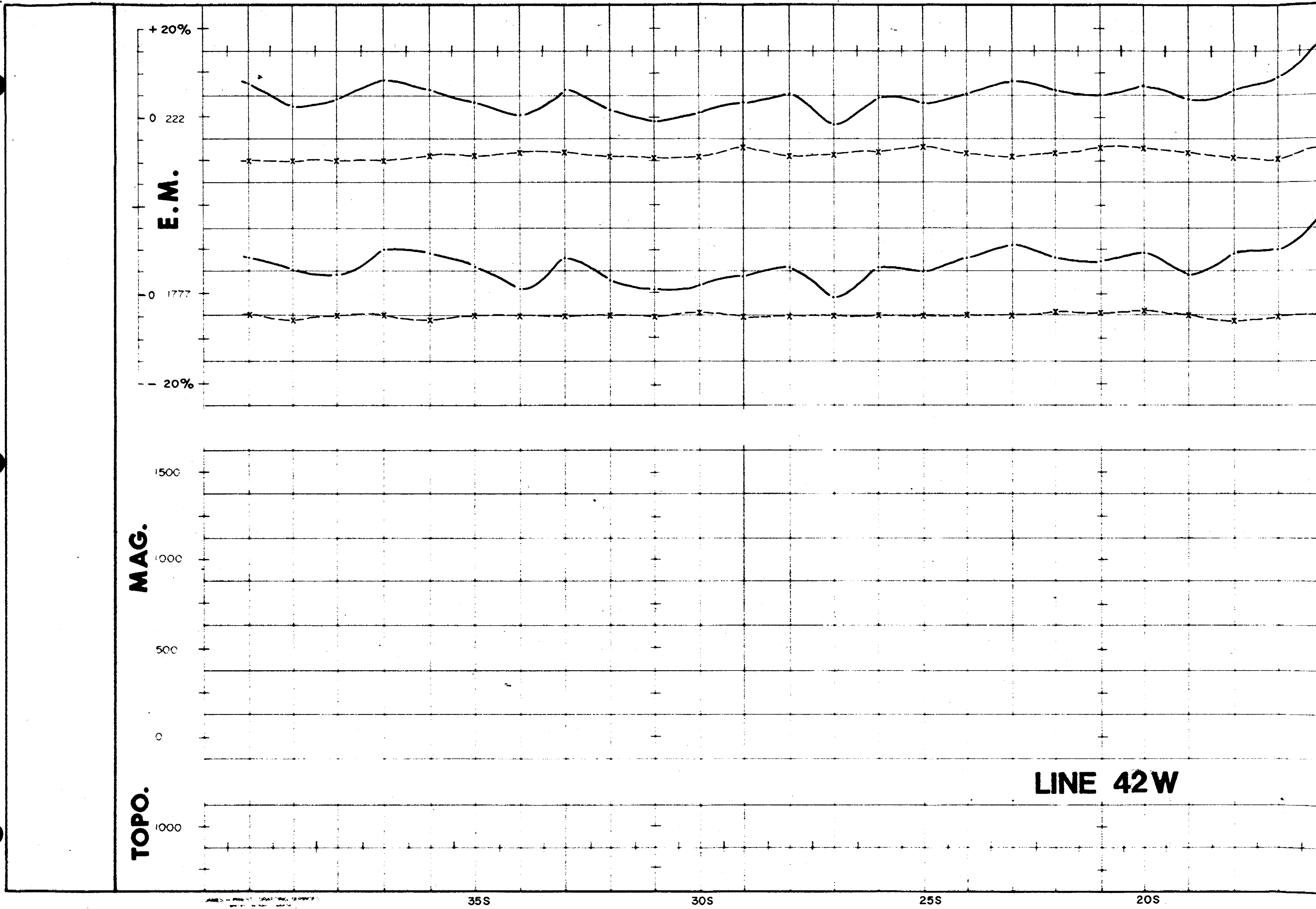


+ 20%
0 222
E.M.
0 1777
– 20%
MAG.
1500
1000
500
0
LINE 12 W
LINE 14
TOPO.
1000
40N
45N
50N
40N
45

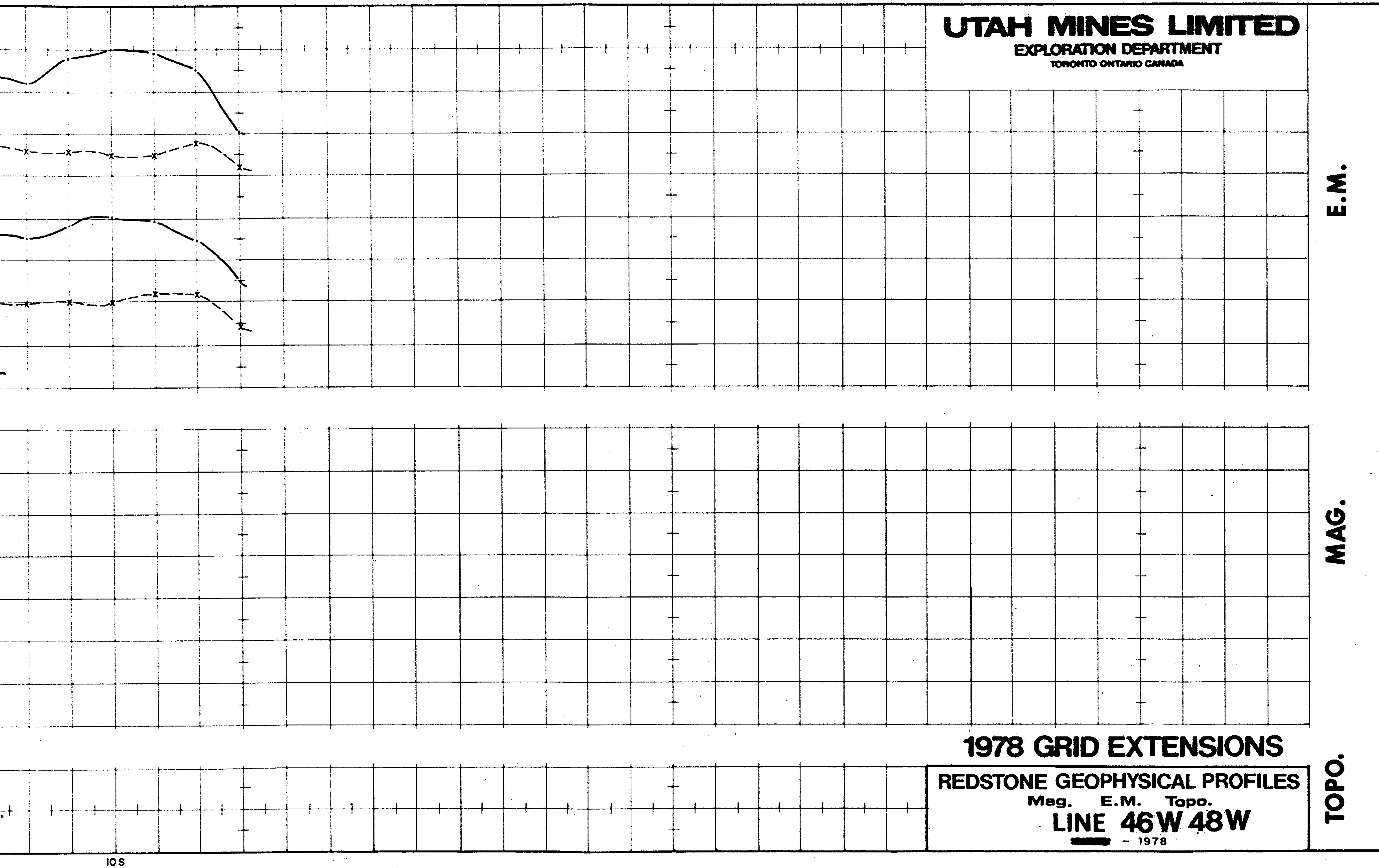

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
MAG.
LINE 44 W
1978 GRID EXTENSIONS
TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 42 W 44 W
[redacted] - 1978
30S
25S
20S
15S



LINE 42W
20S
15S
10S
5S
BL
40S



+ 20%
0 222
E.M.
0 1777
- 20%
MAG.
1500
1000
500
0
TOPO.
1000
LINE 42W
35S
30S
25S
20S



UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA

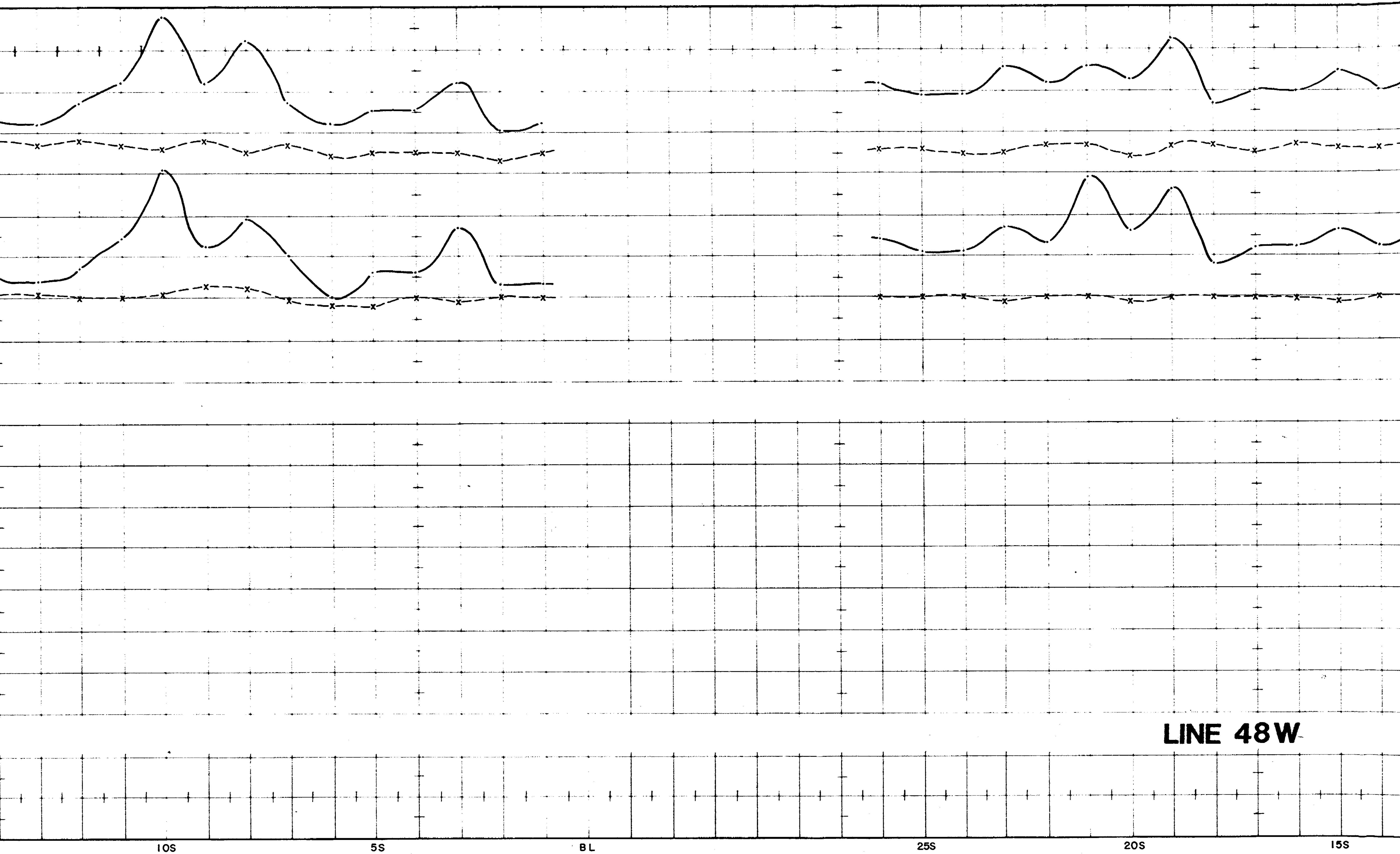
1978 GRID EXTENSIONS

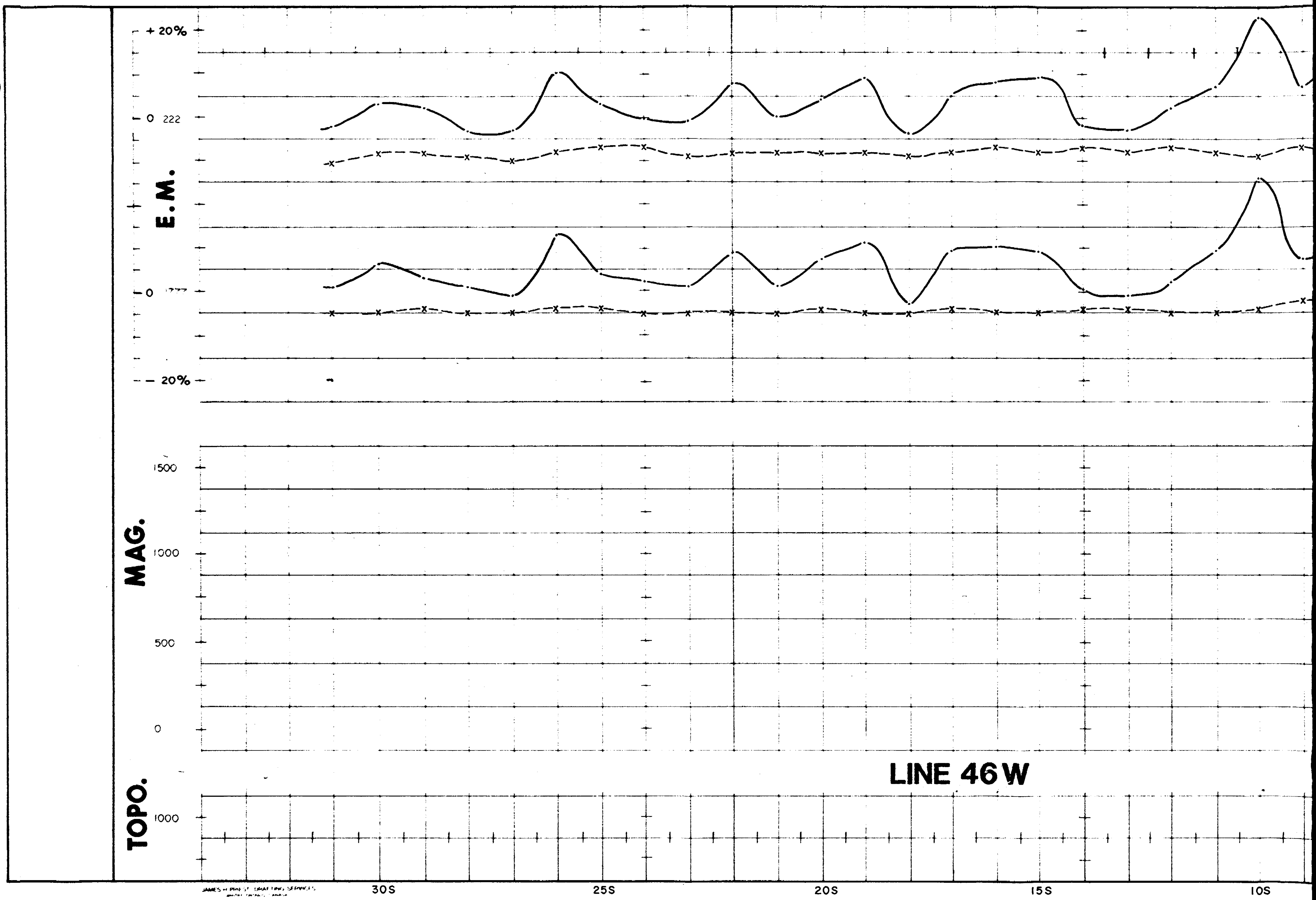
REDSTONE GEOPHYSICAL PROFILES

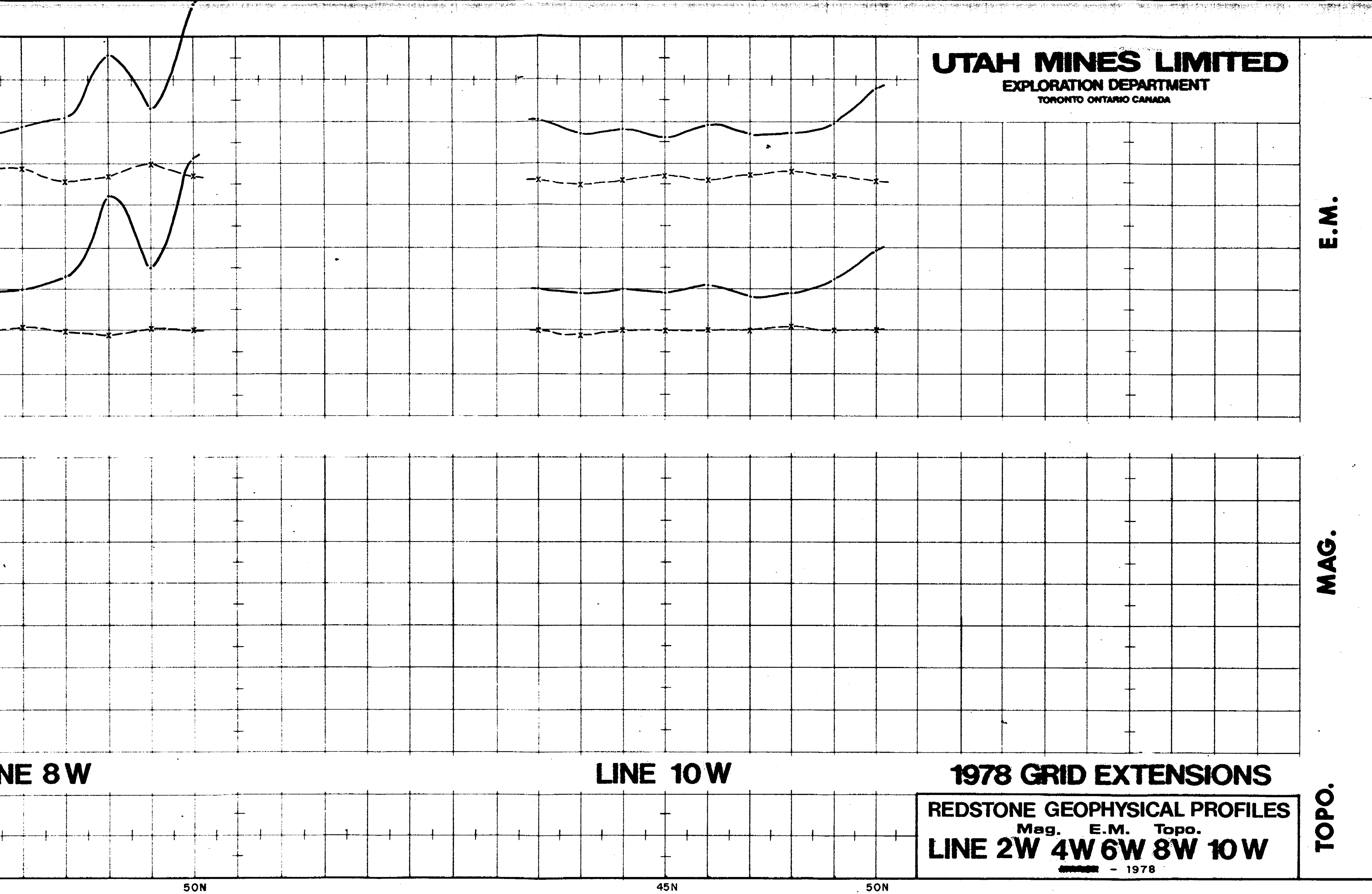
Mag. E.M. Topo.

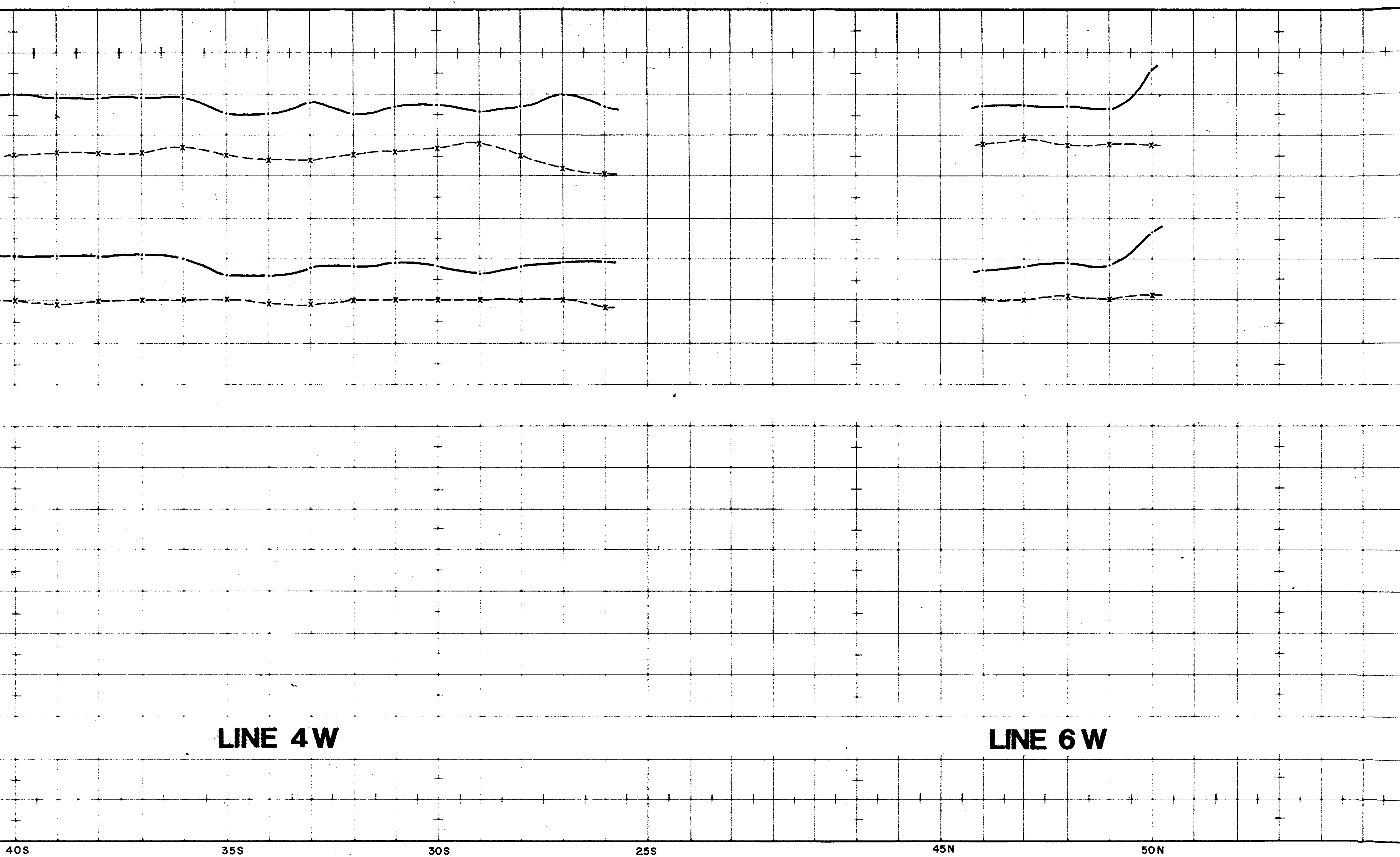
LINE 46W 48W

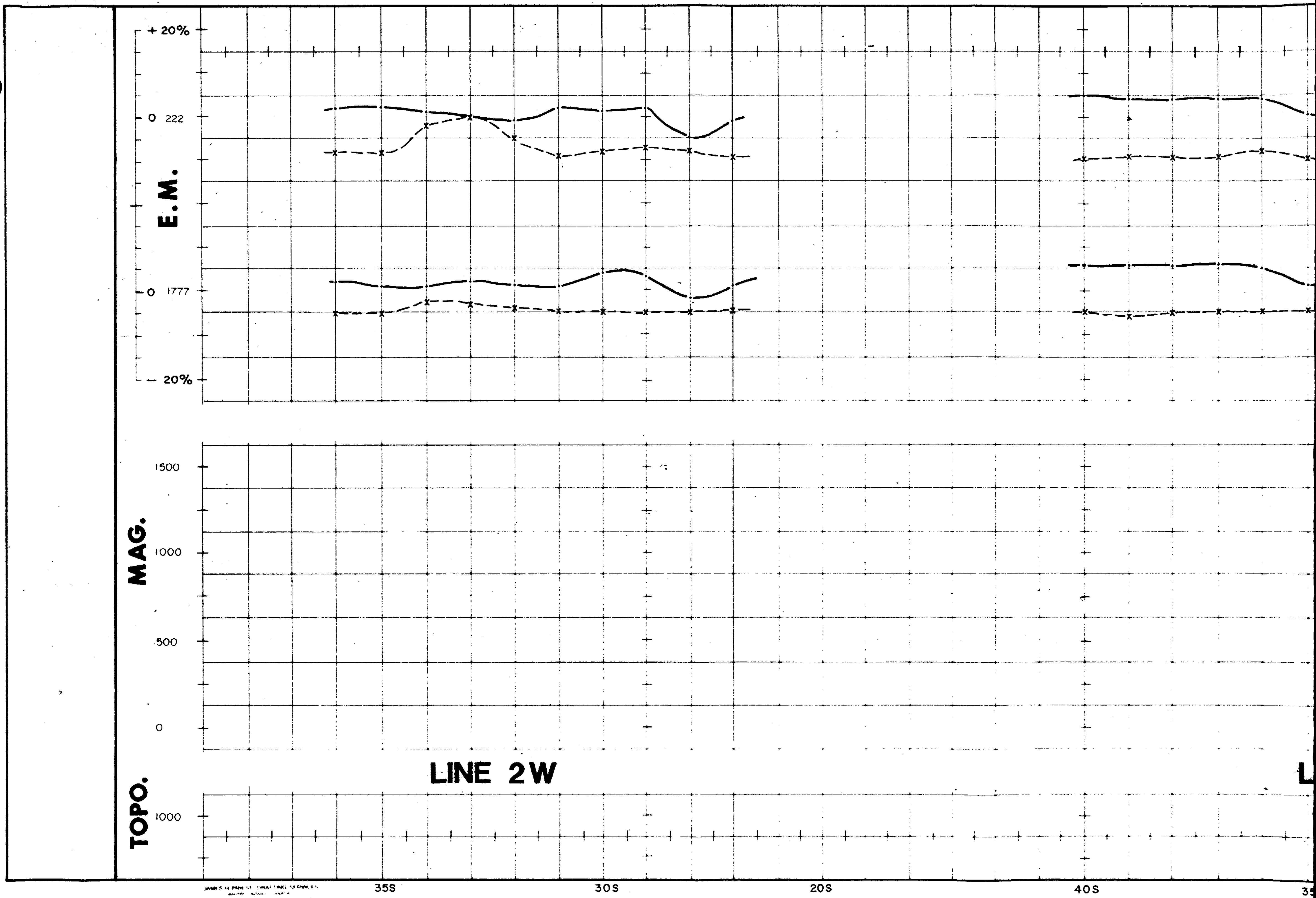
[redacted] - 1978


LINE 48W
10S
5S
BL
25S
20S
15S


LINE 46 W
E. M.
+ 20%
0
- 20%
MAG.
1500
1000
500
0
TOPO.
1000
30S
25S
20S
15S
10S


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
E.M.
MAG.
NE 8 W
LINE 10 W
1978 GRID EXTENSIONS
TOPO.
REDSTONE GEOPHYSICAL PROFILES
Mag. E.M. Topo.
LINE 2W 4W 6W 8W 10W
[redacted] - 1978
50N
45N
50N


LINE 4 W
LINE 6 W
40S
35S
30S
25S
45N
50N


+ 20%
O 222
E.M.
O 1777
— 20%
1500
1000
500
0
MAG.
LINE 2W
TOPO.
1000
35S
30S
20S
40S

UTAH MINES LIMITED

EXPLORATION DEPARTMENT

TORONTO ONTARIO CANADA

E.M.

MAG.

TOPO.

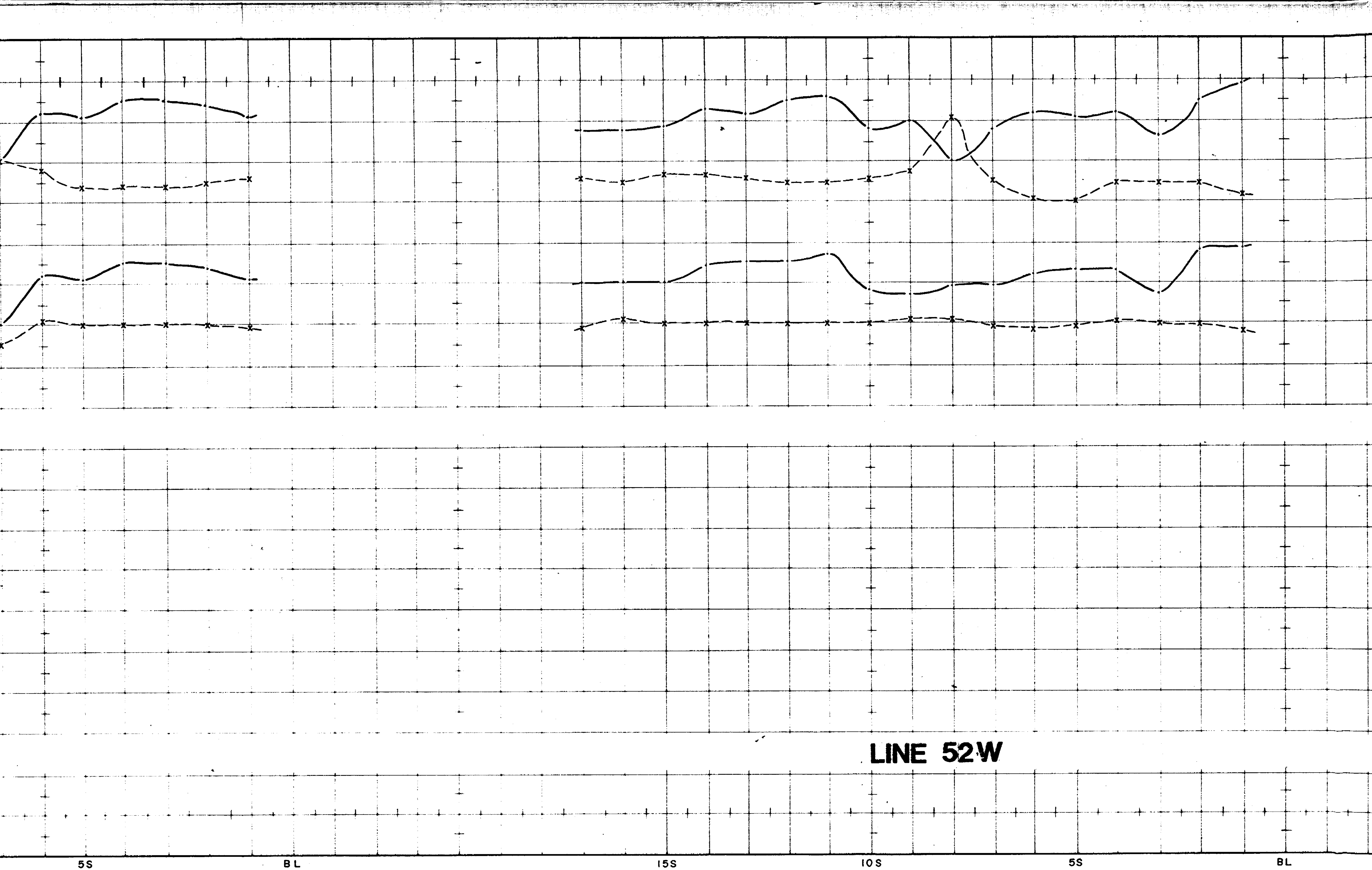
1978 GRID EXTENSIONS

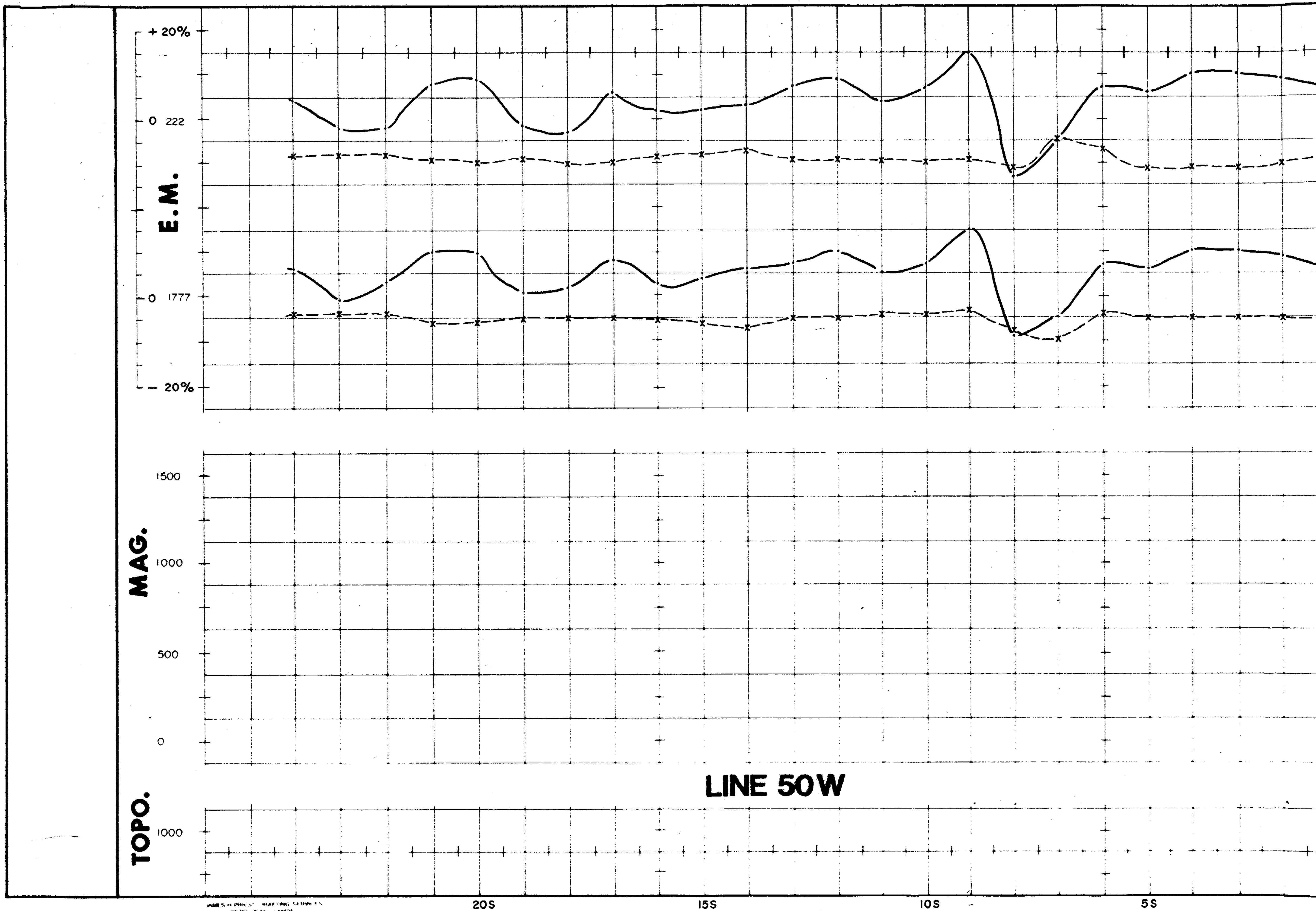
REDSTONE GEOPHYSICAL PROFILES

Mag. E.M. Topo.

LINE 50W 52W

[redacted] - 1978


LINE 52W
5S
BL
15S
10S
5S
BL



+ 20%
0 222
E.M.
0 1777
– 20%
MAG.
1500
1000
500
0
LINE 50W
TOPO.
1000
20S
15S
10S
5S

UTAH MINES LIMITED

EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA

E.M.

MAG.

1978 GRID EXTENSIONS

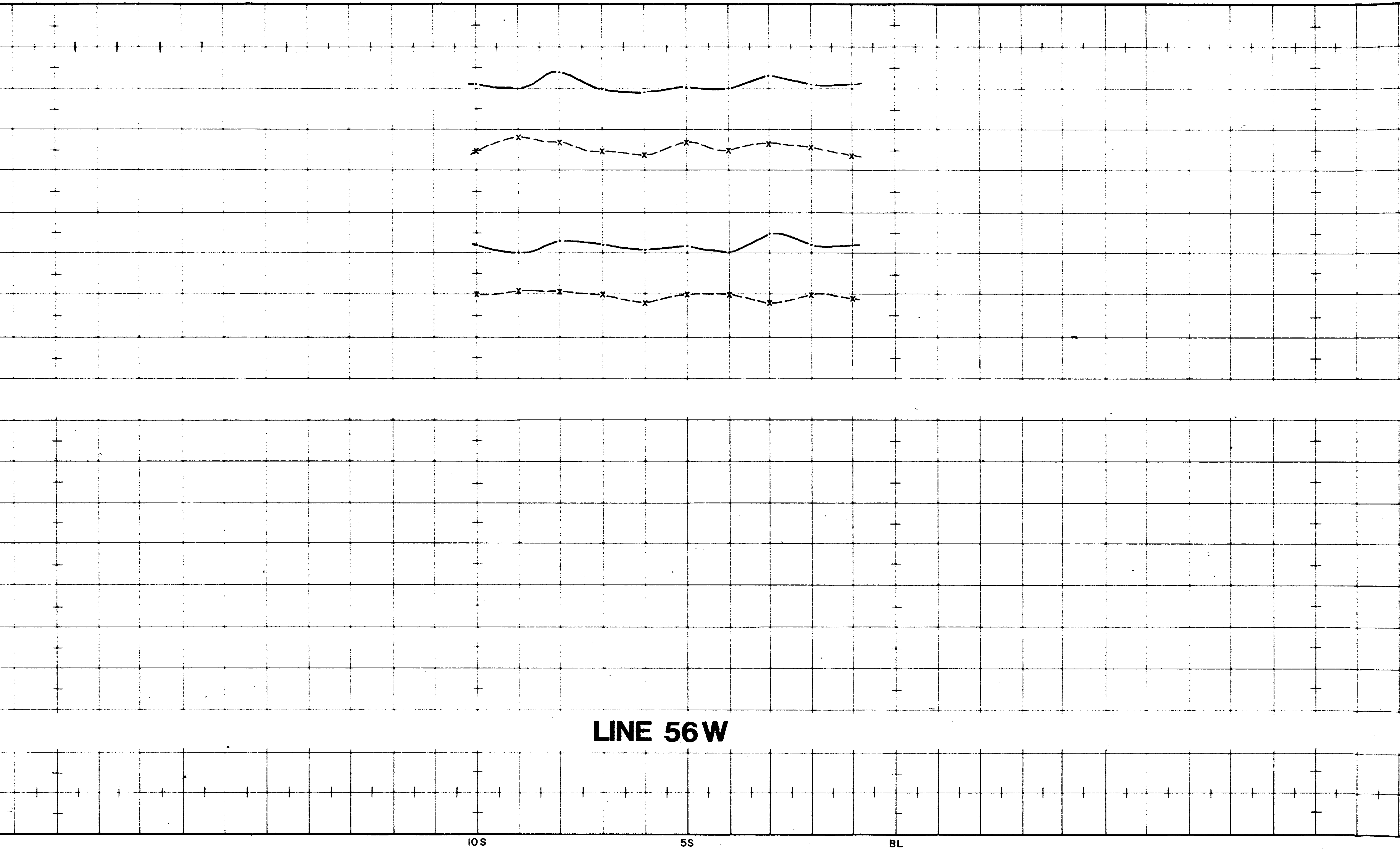
TOPO.

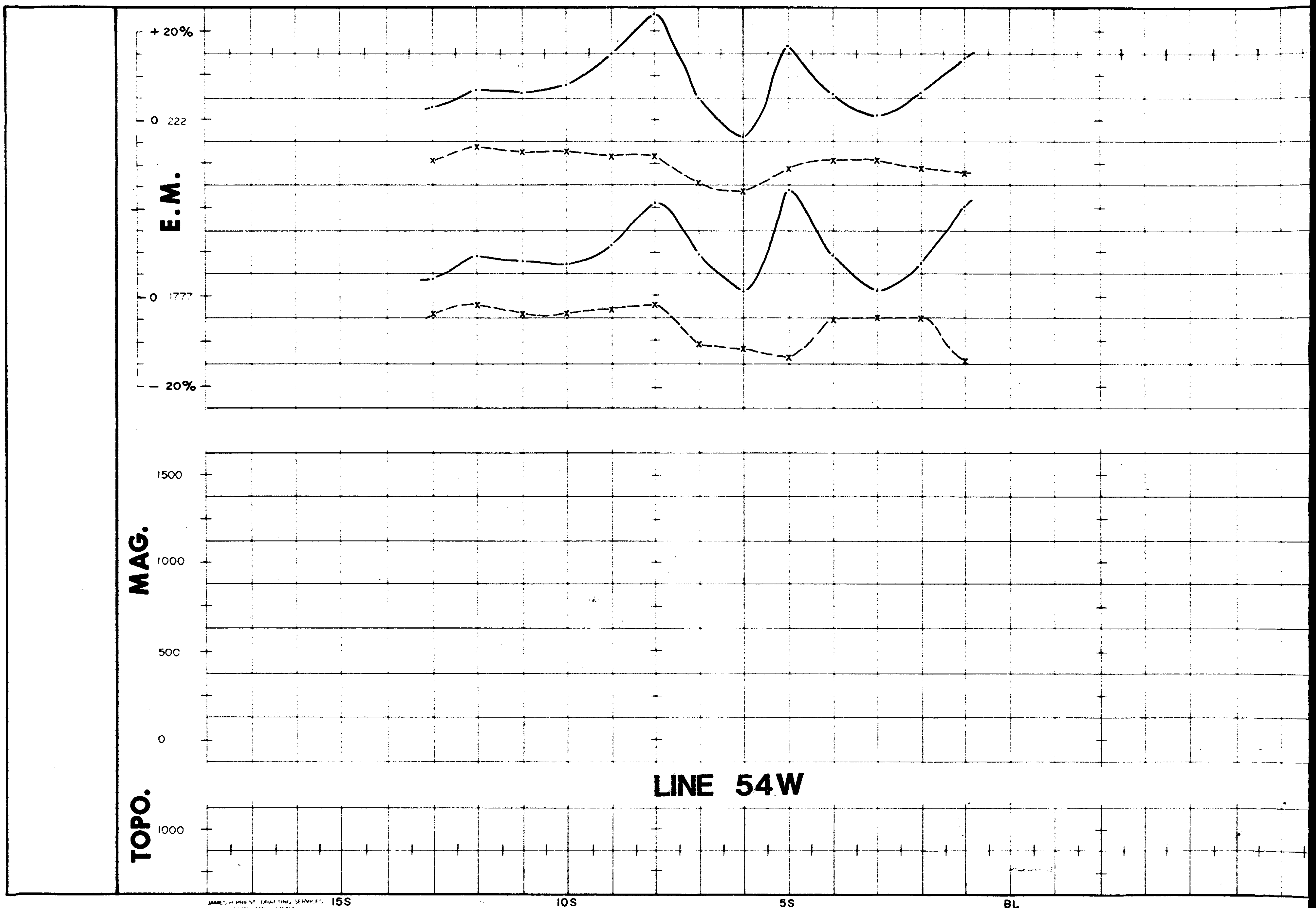
REDSTONE GEOPHYSICAL PROFILES

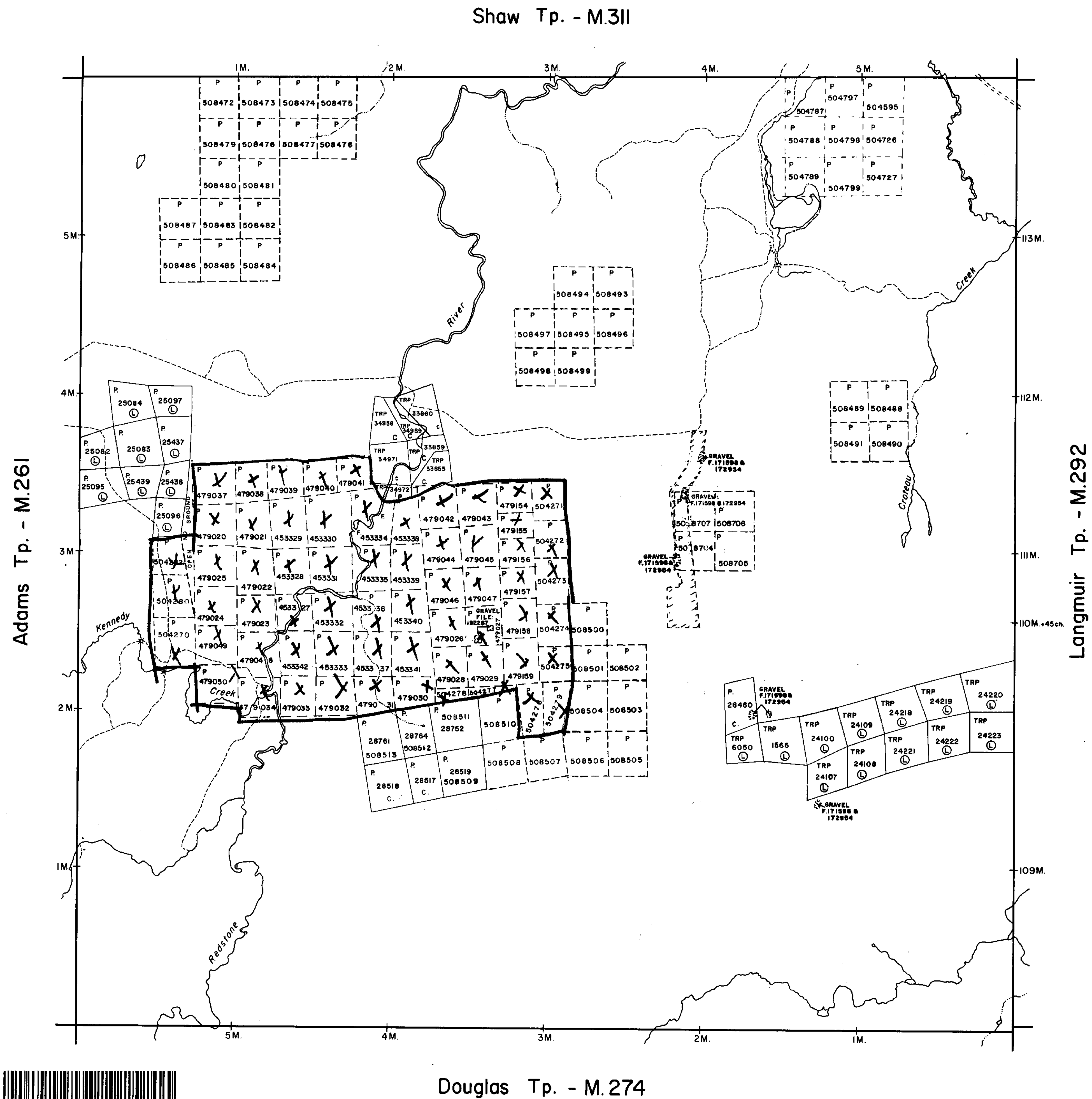
Mag. E.M. Topo.

LINE 54W 56W

[redacted] - 1978


LINE 56W
10S
5S
BL


E.M.
+ 20%
0 222
0 1777
− 20%
MAG.
1500
1000
500
0
LINE 54W
TOPO.
1000
15S
10S
5S
BL



THE TOWNSHIP OF

2.2876

ELDORADO

DISTRICT OF COCHRANE

PORCUPINE MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

PATENTED LAND	● or Ⓟ
CROWN LAND SALE	C.S.
LEASES	Ⓛ
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	⚒
CANCELLED	C.
PATENTED S.R.O.	◓

NOTES

400' Surface Rights Reservation along the shores of all lakes and rivers.

This township lies within the Municipality of CITY of TIMMINS.

PLAN NO. M.276

ONTARIO
MINISTRY OF NATURAL RESOURCES
SURVEYS AND MAPPING BRANCH

42A06SE0090 2.2876 ELDORADO

200


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
REDSTONE PROJECT
MAGNETOMETER
SURVEY
DATE
DRAWN
CHECKED
REVISED
MAP
1 OF 4
SCALE
FEET
Vertical Component as Gammas
24000 E
21000 E
7000 N
6000 N
210


UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
REDSTONE PROJECT
TOPOGRAPHIC SURVEY
DATE
DRAWN
CHECKED
REVISED
N.T.S.
42 A6 NE, Co.
FILE
MAP
1 OF 4
SCALE
FEET
Elevations in Feet Above Sea Level
220

UTAH MINES LIMITED
EXPLORATION DEPARTMENT
TORONTO ONTARIO CANADA
REDSTONE PROJECT
GEOLOGY
DATE | DRAWN | CHECKED | REVISED | N.T.S. 42A6 NI,Ca. | FILE | MAP 1 OF 4
SCALE 200 100 0 200 400 FEET
LEGEND
OLIVINE DIABASE — Medium grained, 60% plagioclase 40% mafics including olivine, some magnetite
FELDSPAR GABBRO — Medium - coarse grained, 65-70% plagioclase 30% mafics up to 1% magnetite
MAFIC DIABASE — Fine grained with approx. 50% feldspar, 50% mafics some magnetite
DIABASE — Coarse grained to fine grained with approx. 40% mafics, 60% plagioclase
GRANODIORITE — Fine - medium grained, includes syenite, monzonite plus minor granite
5 FELSIC VOLCANICS — Includes quartz feldspar, porphyry lappilli tuffs to possible intrusives, aphanitic rhyolite, rhyodacite, quartz latite
IRON FORMATION — Chert - argillaceous chert with massive - disseminated pyrite, pyrrhotite, magnetite frequently thinly banded
INTERMEDIATE VOLCANICS — Includes dacite, argillaceous dacite, cherty dacite, andesite and chloritized andesite
MAFIC VOLCANICS — Chlorite schists (altered magnesian basalts) may include some andesite
ULTRAMAFICS — Peridotite - pyroxenite flows, possible intrusives, some spinifex in unaltered outcrops plus flow brecciation. Commonly altered to serpentine plus talc with magnetite plus magnesite veins, some disseminated pyrrhotite plus pyrite.
SYMBOLS
MINING CORP. — 1966
F-1 FALCONBRIDGE — 1961, location within 50'
CN-25 CANADIAN NICKEL COMPANY 1970-73, location within 200'
UTAH MINES LIMITED 1977
Schistosity - can be equivalent to bedding
Bedding - inclined, vertical
Shear
Fault - interpreted
Contact, delineated, assumed
Jointing - inclined, vertical
Float
Road
Outcrop
MAGNETIC ANOMALY
479045
2.2876
230

Ontario

Ministry of N[illegible]

42A06SE0090 2.2876 ELDORADO

900

GEOPHYSICAL – GEOL[illegible]
TECHNICAL DATA STATEMENT

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) Geological, Magnetometer, Electromagnetic, Topographic

Township or Area Eldorado

Claim Holder(s) Utah Mines Limited

Survey Company Utah Mines Limited

Author of Report Louis Godbout

Address of Author 488 Martin Ave., Timmins, Ontario

Covering Dates of Survey Sept. 1, 1977-August 30, 1978
(linecutting to office)

Total Miles of Line Cut eighty-five

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

Geophysical	DAYS per claim
–Electromagnetic	20
–Magnetometer	20
–Radiometric	
–Other	20
Geological	40
Geochemical	

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer ______ Electromagnetic ______ Radiometric ______
(enter days per claim)

DATE: ______ SIGNATURE: ______
Author of Report or Agent

Res. Geol. L.D. Qualifications on this file

Previous Surveys

File No.	Type	Date	Claim Holder

OFFICE USE ONLY

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
P	453327
P	453328
P	453329
P	453330
P	453331
P	453332
P	453333
P	453334
P	453335
P	453336
P	453337
P	453338
P	453339
P	453340
P	453341
P	453342
P	479020
P	479021
P	479022
P	479023
P	479024
P	479025

TOTAL CLAIMS 63

If space insufficient, attach list

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS – If more than one survey, specify data for each type of survey

EM + Topo-4167

Number of Stations 4167 Number of Readings Magnetometer - 8234

Station interval EM + Topo-100'; Magnetometer-50' Line spacing 200' north of B.L; 400' south of BL

Profile scale Horizontal 1"=200'; Vertical -(Mag. 1"=500 γ), (E.M. 1"=20%), (Topo 1"=200')

Contour interval Topographic - 10', Magnetometer 250 γ

MAGNETIC

Instrument MV - 1 Fluxgate made by Phoenix Geophysics of Toronto

Accuracy – Scale constant 5gammas

Diurnal correction method Constant diurnal variance during Base Station checkin interval

Base Station check-in interval (hours) 1.5 - 2.5 hours

Base Station location and value Line 10 + 00E, 20 + 00N, 601 gammas

ELECTROMAGNETIC

Instrument MaxMin II made by Apex Parametrics Ltd. of Markham

Coil configuration Coplanar mode (horizontal loop)

Coil separation four hundred feet

Accuracy 0.5% of primary field

Method: ☐ Fixed transmitter ☐ Shoot back ☒ In line ☐ Parallel line

Frequency 222 Hz and 1777 Hz
(specify V.L.F. station)

Parameters measured Inphase and out of phase components of secondary field.

GRAVITY

Instrument

Scale constant

Corrections made

Base station value and location

Elevation accuracy

INDUCED POLARIZATION RESISTIVITY

Instrument

Method ☐ Time Domain ☐ Frequency Domain

Parameters – On time Frequency

– Off time Range

– Delay time

– Integration time

Power

Electrode array

Electrode spacing

Type of electrode

SELF POTENTIAL

Instrument ______ Range ______

Survey Method ______

______

Corrections made ______

______

RADIOMETRIC

Instrument ______

Values measured ______

Energy windows (levels) ______

Height of instrument ______ Background Count ______

Size of detector ______

Overburden ______

(type, depth – include outcrop map)

OTHERS (SEISMIC, DRILL WELL LOGGING ETC.)

Type of survey Topographic (secant chaining)

Instrument Suunto PM 5/SPC Inclinometer + 200' steel chain

Accuracy $\frac{1}{2}$ - 1 unit per 100

Parameters measured % grade, secant of slope

______

Additional information (for understanding results) Results used in topographic contour plan and in conducting MaxMin E.M. survey.

______

AIRBORNE SURVEYS

Type of survey(s) ______

Instrument(s) ______

(specify for each type of survey)

Accuracy ______

(specify for each type of survey)

Aircraft used ______

Sensor altitude ______

Navigation and flight path recovery method ______

______

Aircraft altitude ______ Line Spacing ______

Miles flown over total area ______ Over claims only ______

PREFIX	NUMBER
P	479026
P	479027
P	479028
P	479029
P	479030
P	479031
P	479032
P	479033
P	479034
P	479037
P	479038
P	479039
P	479040
P	479041
P	479042
P	479043
P	479044
P	479045
P	479046
P	479047
P	479048
P	479049
P	479050
P	479154
P	479155
P	479156
P	479157
P	479158
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P	504270
P	504271
P	504272
P	504273
P	504274
P	504275
P	504276
P	504277
P	504278
P	504279
P	504280
P	504282